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## Transport for the Foundry Industry

It seems that the Government have made up their mind to nationalise the whole of the transport facilities of this country, except for a few services such as furniture removal, tank lorries, local carriers, and the like. No outstanding practical reasons have been given for the proposed change. The nationalisation of transport will be an intolerable nuisance to the foundry industry, as much desirable flexibility will be lost. Here is not too "far fetched" an example, based on fact. A lorry load of coal dust left the grinding mills one morning and no sooner had it gone when the despatching concern had an urgent call from a large foundry that as a result of a fire it was completely devoid of stocks. Steps were straightaway taken to divert this lorry load to the new destination. Again, not infrequently, the foundries located in the Black Country use their own lorries for distributing castings in the London area. These lorries may do one of many things. They may bring back a load of sand; they may make a detour to pick up a new pattern or deliver a prototype casting or a small batch to be taken from the major consignment, or again, a load may be made up of several consignments for one area. Again, the lorry driver often acts as personal liaison between the foundry and the consuming works, and on, we hope rare, occasions, will take back to the works a defective casting with a verbal explanation as to why it is being returned. We do not wish to sully the good name of the foundry industry, but presuming the same group of drivers would be sent constantly from the Transport Board to service one individual foundry, then a system of "sops" will creep in to get the men to do jobs not specifically set out in the official form. Of course, it is possible that the Authority may rule that all castings must go by rail, in which case most of the grumbles will be by the customers, who appreciate the door-to-door service now given. The railway companies' delivery vans often carry advertisements on their side; it is, we understand, quite a profitable source of revenue. Should the Transport Board continue this system, one could imagine the consternation at Bloggs' foundry, if a lorry arrived to take away a consignment of components carrying the slogan "Buy Noggs' castings—cheapest in the long run."

Transport, to be of maximum use, must be really flexible and we have yet to learn how increased flexibility can be afforded by any system of centralisation of direction. It has long been the practice in the larger works to have on the staff an executive officer whose sole job is to organise the traffic within the factory area, and to control a fleet of lorries and works cars. Those who were privileged to hear Sir Claude Gibb deliver the last Edward Williams lecture of the Institute of British Foundrymen, will recall how this official was brought in early in the design of large plant; how by co-operation with the railway companies weeks in advance the line was cleared stage by stage; How signal boxes were temporarily removed, and so forth. These are not problems which will submit of an easier solution under rigid bureaucratic control, for it has yet to be disproved that "what private enterprise cannot achieve, cannot be achieved by a government department." The quotation is from an address given by Mr. H. H. Berresford in Birmingham, Alabama. By every means at their disposal foundries—especially those using long distance lorries—should join in the chorus of protest now fairly strident throughout the country against the nationalisation of transport.

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## FORTHCOMING EVENTS

*(Secretaries are invited to send in notices of meetings, etc., for inclusion in this column.)*

DECEMBER 16.

*Sheffield Society of Engineers and Metallurgists* :—" Some Recent Problems for Railway Metallurgists," by Dr. H. O'Neill. At the Royal Victoria Station Hotel, Sheffield, at 6.15 p.m.

DECEMBER 17.

*Sheffield Metallurgical Association* :—" The Physical Chemistry of Steel-making Reactions," by Dr. J. White. At the Metallurgical Club, West Street, Sheffield, at 6.30 p.m.

DECEMBER 18.

*Institute of Fuel (Yorkshire section)* :—" Fischer-Tropsch Process—Present and Future," by Dr. C. C. Hall. At the University, Leeds, at 2.30 p.m.

*Institution of Production Engineers (Sheffield section)* :—" Modern Trend in Heavy Machine Tool Design," by J. Rivers. At the Royal Victoria Station Hotel, Sheffield, at 6.30 p.m.

DECEMBER 19.

*Institution of Mechanical Engineers* :—Joint meeting with the Institution of Electrical Engineers. " The Future of Pulverised Coal Firing in Great Britain," by C. H. Sparks. At the Meeting Hall, Institution of Electrical Engineers, Savoy Place, London, W.C.2, at 5.30 p.m.

DECEMBER 20.

*Keighley Association of Engineers* :—Brains trust. At Devonshire Buildings, Devonshire Street, Keighley, at 7.30 p.m.

**Institute of British Foundrymen**

DECEMBER 13.

*Middlesbrough branch* :—" German Steelfoundries," by J. E. Mercer. At the Cleveland Technical and Scientific Institute, Middlesbrough, at 7.30 p.m.

DECEMBER 14.

*Bristol and West of England branch* :—" Loam Moulding," by R. D. Lawrie. At the Grand Hotel, Broad Street, Bristol, at 3 p.m.

*East Midlands branch* :—" Foundry Problems," submitted by members. At the Technical College, Derby, at 6 p.m.

*Scottish branch* :—" American and German Steelfoundry Practice," by B. Gray. At the Royal Technical College, Glasgow, at 3 p.m.

*West Riding of Yorkshire branch* :—Brains trust. At the Technical College, Bradford, at 6.30 p.m.

DECEMBER 20.

*London branch* :—Annual dinner (men only). At Pimms Road House, Bishopsgate, London, E.C.2, at 6.30 p.m.

DECEMBER 27.

*Falkirk section* :—" Vitreous Enamelling of Chemical Plant," by J. Currie. At the Temperance Café, Lint Riggs, Falkirk, at 7 p.m.

## PROPERTIES OF CAST BRONZES

In Dr. W. T. Pell-Walpole's Paper on " The Significance of Variations in the Tensile Properties in Cast Bronzes," which appeared in our issue of October 24, the following errors occur: The captions to Figs. 13 and 14 have been transposed; the caption to Fig. 18 should read " 0.1 per cent. phosphorus," instead of " 1.0 per cent.," as printed, and on page 187, left-hand column, the first sentence under the sub-title, the composition of the low phosphorus billets should be 0.3 and not 8.3 per cent. P. We regret any annoyance these errors may have caused.

## NOTES ON GERMAN MALLEABLE PRACTICE

Facing sand used in a German foundry making whiteheart malleable is, according to B.I.O.S. Report No. 878, Item No. 31, made up in a Simpson mill using pre-roasted new sand—a fine silica carried a natural admixture of 8 to 10 per cent. clay—with premilled and sieved used sand, 3 to 5 per cent. coal dust, and 4 to 5 per cent. water. The coal used is pulverised to pass 150 to 180 mesh per inch before mixing.

The annealing cycle in an 85-ft. long tunnel furnace was 50 to 55 hrs., heating up the cold charge to 1,000 deg. C.; 100 hrs. at 1,000 deg., and 40 to 50 hrs. for the cooling down period. The fuel consumption was said to be 30 per cent. less than the batch type. Scandinavian hematite ore, carrying five per cent. new material was used in the annealing process. After using, it is put through a two-tier sieving machine equipped with 5-mm. and 3-mm. screens. Scale is retained on the 3-mm. screen, and the ore passing through the 3-mm. [5-mm.] screen, which amounts to about 5 per cent., was discarded.

Ordinary cast-steel pots with an initial wall thickness of 1½ to 2 in. are used. They are about 2 ft. × 2 ft. × 3 ft. long, and are formed into stacks, the uppermost carrying a lid. The life of each pot is only 5 heats and after each heat the pot is descaled with a gas flame and painted with loam. Vibrators are used to aid the consolidation of the pack.

## VITREOUS ENAMELLING OF ALUMINIUM

" Light Metals Research," published by the British Aluminium Company, Limited, prints abstracts of Patent Nos. 580,688 and 580,689 granted to E. I. Du Pont du Nemours & Company, and Mr. A. J. Deyrup, with the addition, in the case of the second one, of Mr. C. Robertson. Both relate to the vitreous enamelling of aluminium base alloys. The first abstract reads:—" A vitreous-enamel composition suitable for use as a protective coating and/or for decorating the surfaces of aluminium and aluminium base alloys, comprising 25 to 65 per cent. lead oxide (PbO), 20 to 35 per cent. silica, 1 to 15 per cent. titanium dioxide, and a total of 10 to 30 per cent. of one or more of the alkali metal oxides selected from the oxides of sodium, potassium and lithium. The composition may also contain up to 10 per cent. boric oxide, up to 7 per cent. zirconium oxide, 0.5 to 5 per cent. antimony oxide ($Sb_2O_3$) and 1 to 15 per cent. of a ceramic pigment. The proportion of lithium oxide should not exceed 9 per cent. The enamel is fired at temperatures between 400 and 550 deg. C."

The second one reads:—" Enamel compositions in accordance with claims in B.P. 580,688 are applied to heat-treatable aluminium alloys and the firing of the enamel is combined with the solution heat-treatment of the aluminium alloy, after which it is quenched."

# INFLUENCE OF DESIGN AND PATTERN-MAKING ON FOUNDRY TECHNIQUE*

*Development of competitive methods of production of high-duty castings*

By T. H. SNEDDON

**Synopsis**

It is understood by foundrymen that a pattern of some description must be used in the production of a casting. Naturally, when one or only a few castings are required, the cheapest form of pattern is supplied owing to the factor of cost, etc., even to the extent of sweeps or strickles, for a circular casting. The foundryman acknowledges this fact and, if allowed to give advice as to the making of the pattern or strickles, can not only produce a suitable job for the customer at a reasonable price, but can also supply the foundry with a pattern design which will prove economical. This, however, is not a slight on pattern-making in general, but a percentage of pattern-makers do not have sufficient practical knowledge of a foundry, to realise fully the foundryman's necessities on an unorthodox casting and, if not given the assistance of a foundry technician, can supply a pattern which is economical to the customer but, uneconomical to the foundry. This Paper, however, does not only deal with the construction of a cheap pattern but also the design and construction of a first-class pattern for use in a repetition or semi-repetition foundry. It is necessary to stress the fact of not only producing a pattern for moulding purposes but, as far as steel castings are concerned, for feeding purposes also.

## Use of Strickles

It can be recognised that to the foundryman, the first part in the art of moulding, is to be able to make a mould, from a pattern and core boxes, to produce a casting, dimensionally accurate, but to produce a casting from strickles, is an art far in advance of the normal moulding procedure. It is therefore essential, to deal, firstly, with not only the use of strickles, but the application of foundry technique in designing them to produce the most economical mould.

In the case of a large "roaster ring" casting, as shown in Fig. 1, which is of unorthodox design, the pattern-maker has, at least, to supply strickles so that the moulder can strickle a drag-part, mid-part, top-part and a core or the internal shape of the ring. This, of course, means four strickling operations and a top-part rammed on a sand-strickled face. It is a recognised procedure where pattern-makers are concerned but, when moulding technique is applied, this can be altered to a great extent and, from a time factor, the moulding hours can be reduced by half. In place of the four strickling operations only one strickle is required and two section core boxes (as also shown in Fig. 1). No top-part is required as core B is a cover core, the print for which is strickled with the external shape of the casting. Formerly, a mid-part was required to enable the internal diameter of the casting to be strickled, but this has been obviated, owing to the shape being taken out by core A, the base print of which is also contained on the strickle. This, of course, adds some time to the closing of the mould but, as all the mould is made in the drag-part, it lends itself to more accurate closing, as the metal thicknesses and position of each core can be gauged with the exception of the last cover core and, as the risers are through this core it can also be gauged almost to perfection.

## "Throat Ring" Casting

A "throat ring" casting, which is not just so complicated as that shown in Fig. 1, can also be made in a manner peculiar to the normal procedure. The procedure in this case, as supplied by the pattern-maker, is to ram and strickle a drag- and mid-part, the mid-part being stripped off after strickling, to allow the internal shape to be strickled. The top-part, of course, can be rammed on a flat plate, either by hand, machine or Sandslinger ramming as there is no top shape. The only thing being, correct placing of risers and downgates, etc., which can easily be done by scribing the internal and external diameters on the chalked surface of the plate (see Fig. 2). By the application of the section core to form the external diameter (contrary to the ring in Fig. 1 which had the external shape strickled) one strickling operation only is necessary. The reason for this change of procedure is to strickle the simple part of the casting and allow the core to make the intricate part as far as is possible. When section cores of this nature are applied to a mould, it is profitable to have them made flat-backed so that they can be rammed on a core machine and turned out on flat plates, thus assuring the minimum of handling and also saving the risk of mis-shapen cores which is often the result of using round or bow-backed cores.

## "Wheel" Casting

The "wheel" type of casting, which is one of the most common jobs to be strickled, can also be revolutionised by foundry technique. The normal strickles supplied are, in most cases, two. First, a drag-part is

* A Paper read before the Scottish branch of the Institute of British Foundrymen at a meeting in the Royal Technical College, Glasgow.

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rammed, the top shape of the casting strickled and used as a sand pattern shape for the purpose of ramming the top-part. This is then parted off and the drag-part mould scooped out for the purpose of strickling the drag shape. The normal wheel design

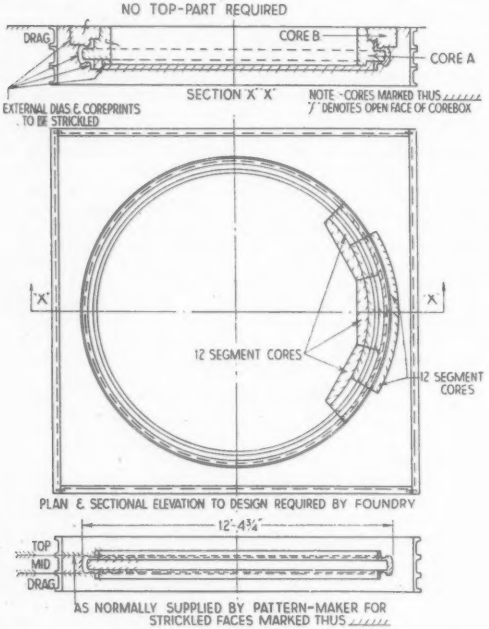


FIG. 1.—"ROADSTER RING."

is a centre boss and a rim which are connected up by a specified number of "H"- or "T"-sectioned ribs. This design necessitates the use of a segment core box to form the shape between the ribs. Going from the normal method of moulding to that shown in Fig. 3, which again reduces the strickling to one operation only, thus avoiding the use of the top-part. The core box, which is an essential part of the job, irrespective of which design is applied, can be altered slightly to form the top shape of the mould allowing for a continuous riser over both the boss and the rim. If necessary, a splitter core can be used to provide a bearing level and can be supplied at a very low cost.

The true object of eliminating strickles as much as possible, is to save the foundryman from his most arduous task, without adding cost to the job and, in many cases, reducing the cost to a great extent. This is more essential in steel moulding than in iron moulding, as the types of sand, commonly used in a steel-foundry are of such a nature that a strickling operation is really hard work, whereas in an ironfoundry the percentage of strickling work is done by the use of a loam which can be strickled very easily and is not such a tedious operation. By reducing the strickling time and introducing the use of cores, particularly cover cores, the mould is on the floor for a shorter period, fewer moulding boxes are required, and, on the whole, greater production can be attained which is a really important factor in most foundries at the present moment.

### Patterns and Core Boxes

Progressing onwards from strickles to patterns and core boxes it can be stated that from the foundryman's point of view, the most desirable mould to make is one which can be made in two parts, *i.e.*, a top-part and a drag-part, or, if possible, only a drag-part. This, of course, is only desired and unfortunately, some moulds have to be made in three or more parts to suit the type of pattern supplied and the method of moulding applied in the foundry to suit feeding and closing methods, etc.

The first example of this is a "waterbox" casting which has two vertical flanged pipes protruding from the main body of the casting (see Fig. 4). For feeding

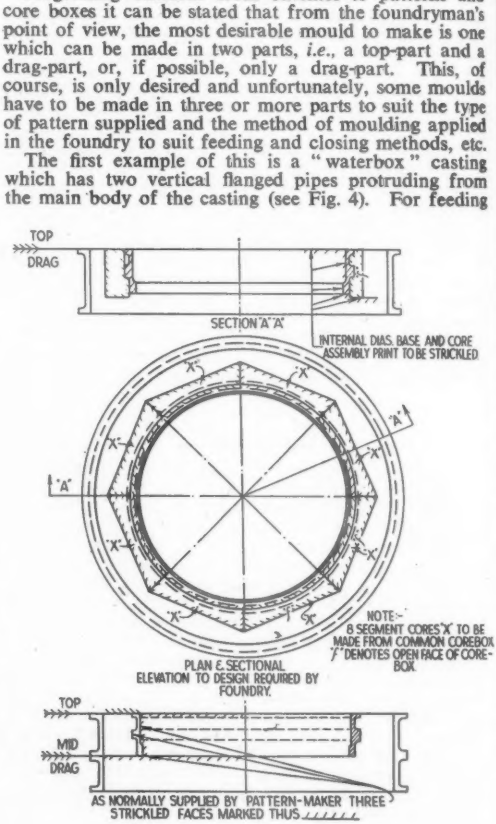
TOP
DRAG
SECTION 'A' 'A'
INTERNAL DIAS. BASE AND CORE ASSEMBLY PRINT TO BE STRICKLED
'X'
'A'
NOTE:- 8 SEGMENT CORES 'X' TO BE MADE FROM COMMON COREBOX
// DENOTES OPEN FACE OF CORE-BOX.
PLAN & SECTIONAL ELEVATION TO DESIGN REQUIRED BY FOUNDRY.
TOP
MID
DRAG
AS NORMALLY SUPPLIED BY PATTERN-MAKER THREE STRICKLED FACES MARKED THUS //////

FIG. 2.—"THROAT RING."

purposes the pipes have to be cast up with two risers on each, leaving a body of sand between each riser for the purpose of retaining part of the coreprint. If the mould is made in two parts the cores would require to be set into the drag-part and the top-part closed over. The danger of this is if the cores, being slightly sided and crushing the top coreprints, dirt would be present in the mould and would result in a casting with sand inclusions. To avoid this, a parting is made at the top of the flanges, allowing the mid-part to be closed on, the pipe cores inserted and jammed with chaplets or studs, before the top-part is closed over. To eliminate this parting and still be able to insert the cores after closing on the top-part, the foundryman's request is that the flanges be made loose and dowelled to the pipes with full risers attached to them. The core box for the pipe cores has to be made long enough to protrude through the top of the moulding box, forming a "stangie" core. The result is, when the mould is rammed, risers and flanges are withdrawn through the top side of the box, which is then turned over and the pattern withdrawn without obstruction. In closing, the top-part is closed on, the pipe cores inserted and weighted down to prevent their lifting. This process results in a more profitable mould and a cleaner casting.

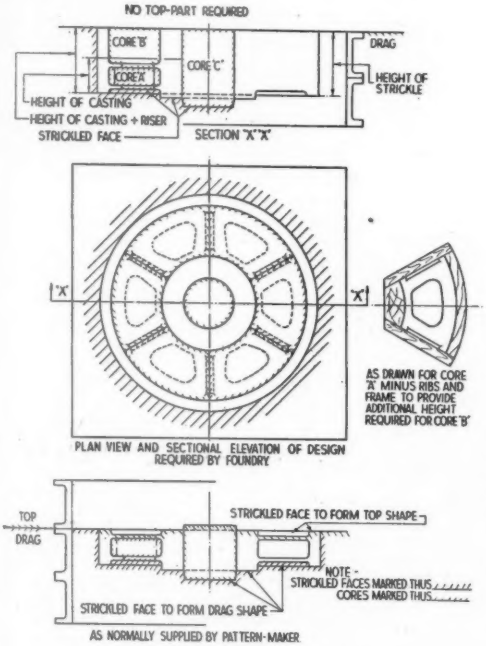


FIG. 3.—"WHEEL" CASTING.

### "Liquid Channel" Casting

Another and more outstanding example of foundry technique applied to pattern design, is found in the production of a "liquid channel" casting. This is a large, hollow, dome-shaped casting with a heavy flange at the open end (see Fig 5). Being a high-pressure casting, chaplets have to be avoided on the main body,

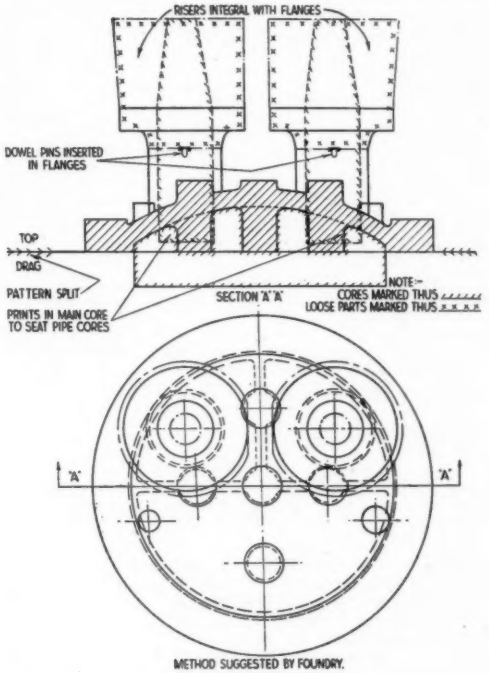


FIG. 4.—"WATERBOX."

the core, therefore, has to be bolted down into the drag-part, a parting made to check thicknesses, and a top-part, carrying the dome-shaped part of the casting, closed over this. It is discovered that this is not an ideal method, both from a moulding and feeding point of view. To overcome the difficulties, it is decided to reverse the moulding method. To ensure that no chaplets are required, the coreprint is made six in. deep, with three arms eight in. wide protruding six in. past the outside edge of the flange, thereby providing enough support to retain the core in proper position. The remainder of the flange surface is now covered by risers and the pattern is built up six in. to ensure a flat surface and permit the full pattern to be rammed in the drag-part. The top-part is now very plain, containing only three risers and a downgate. This method

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converts a somewhat difficult and troublesome job into a fairly simple and economical one, having not only changed it from a hand-moulded job to a machine-moulded one, but also results in very sound castings, owing to the fact that it is now being directionally fed. It may be stated that this casting weighs approximately three tons and special provisions are really justified, as any wasters from the old method prove a financial loss to the foundry and delivery of castings is held up considerably.

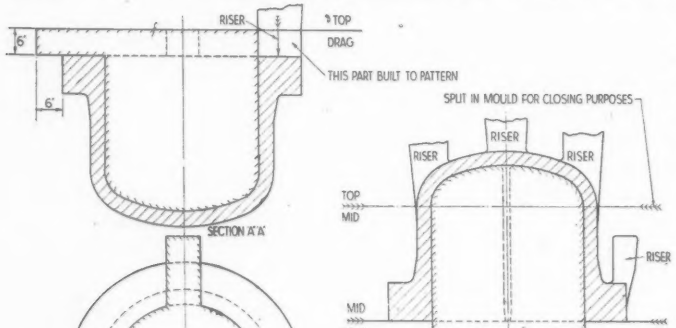


FIG. 5.—"LIQUID CHANNEL."

### "Flexible Coupling" Casting

As it has been previously mentioned of altering a pattern to suit machine moulding, the Author will now deal with a pattern which, before being made, the drawing is sent to the foundryman, to submit his design. The pattern required is for a "flexible coupling" casting which is of cylindrical shape, hooded, with a flange connected to the body at the wide, open end, and a smaller flange connected to a short pipe, protruding from the hooded end (see Fig. 6). A fairly large number of castings is required, so the decision is to design a pattern suitable for machine moulding. The moulding machine in question is a 10-ton "Jackman" jolter, which is used entirely for medium and heaving castings production. The pattern is split on the back face of the large flange on to which the main coreprint is fixed. The remainder of the pattern is made in one piece and contains the other flange, which, if made to casting shape, cannot be withdrawn from the mould. As the distance between the back of this flange and the casting proper is only a few inches, it is decided to block out behind the flange, to allow the pattern to be withdrawn with no obstructions, and to make it a simple machine moulding proposition. The moulding machine concerned has a large flat table 6 ft. square, upon which a 1½-in. thick mild-steel plate is fixed. This plate has a series of holes drilled through it. These holes are normally running along the centre lines of the plate, some of which are $\frac{2}{3}\frac{1}{2}$ in. diameter to take a ¾-in. dowel pin, and the remainder $\frac{4}{6}\frac{9}{4}$ in. diameter to take a ¾-in. dia. moulding box pin. The dowel holes are at 6-in. pitches from the centre of the plate, extending for 24 in. on either side, while the pin-holes are drilled to suit various sizes of moulding boxes. It is, therefore, essential, on machine moulding of this description, to

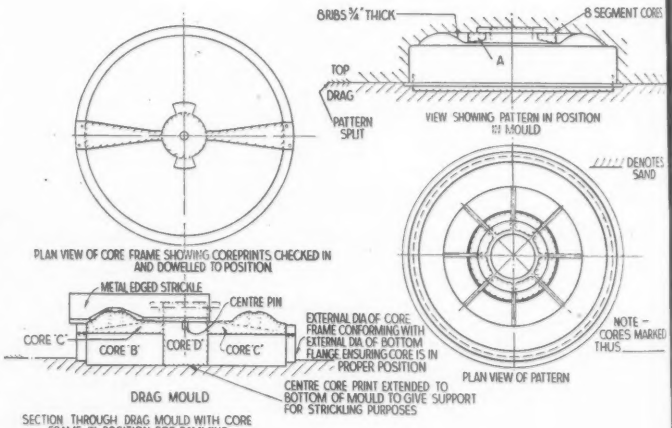
8 RIBS ¾" THICK
8 SEGMENT CORE
A
TOP
DRAG
PATTERN SPLIT
VIEW SHOWING PATTERN IN POSITION IN MOULD
DENOTES SAND
PLAN VIEW OF CORE FRAME SHOWING COREPRINTS CHECKED IN AND DOWELLED TO POSITION
METAL EDGED STRICKLE
CENTRE PIN
CORE 'C'
CORE 'B'
CORE 'D'
CORE 'C'
EXTERNAL DIA OF CORE FRAME CONFORMING WITH EXTERNAL DIA OF BOTTOM FLANGE ENSURING CORE IS IN PROPER POSITION
NOTE – CORES MARKED THUS
PLAN VIEW OF PATTERN
DRAG MOULD
CENTRE CORE PRINT EXTENDED TO BOTTOM OF MOULD TO GIVE SUPPORT FOR STRICKLING PURPOSES
SECTION THROUGH DRAG MOULD WITH CORE FRAME IN POSITION FOR RAMMING

FIG. 6.—"BLOWER COUPLING."

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have centre lines scribed on the joint faces of the pattern, so that the foundry pattern-maker can insert male dowels on both halves without fear of the castings being sided. Four core boxes are required for this job. The block core (A), to take out the shape between the flange and main body, is made as a segment core. Eight cores complete the circle but are apart from each other, as there are eight strengthening ribs on the casting and the core box is made $\frac{1}{8}$ of a circle less the rib thickness, to allow for them. Core (B) can be regarded as the main core, as it forms the internal shape of the casting and is made in a peculiar manner. A wooden ring is built up, the internal size being that of the internal diameter of the casting, whilst the outside size is that of the outside diameter of the main flange. Two slots are cut out of the top of the ring and a wooden crossbar, containing the prints for cores (C) and the centre core (D), is inserted. A strickle is used to strickle the top shape of the core, a pin hole being provided in the crossbar for this purpose. The reason for the outside of the ring being made to the flange diameter, is to allow the core to be rammed against the drag-part mould, thus assuring that the core is in proper position to the flange. If any errors are made in closing, they can only occur on the outside body diameter, which is not so important and not so easily discovered on the casting. The core-print for core (D) is extended to the depth of core-print in the drag-part mould to give the support required, while strickling the top of the main core. The other advantage of ramming the core on the drag-part is that no cast-iron core grid is required, a few rods being driven into the mould and bound by a mild steel ring of $\frac{1}{4}$-in. dia. section. Cores (C and D) are made and inserted in the normal manner.

Up to this point, all patterns discussed are for producing heavy and medium steel castings, the maximum amount required being in the region of 20 to 30. They, therefore, cannot be classed as production patterns but as good quality jobbing patterns, which are of the best designs possible for the sum allocated and, although they do not make the moulding of them foolproof, they show definite steps in that direction.

(*To be continued.*)

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SIR STAFFORD CRIPPS, President of the Board of Trade, who was the chief guest at the Royal Society's 284th anniversary dinner last week, said that pure research could not be planned or organised, for those who entered that work were explorers into the unknown and must be allowed to chart their own path. We must for ever be keeping free the channels of the interchange of knowledge between the peoples of all nations, he said, for this was one of the great cultural forces that might yet succeed in countering the tendency to isolation of nations or groups of nations, which was so great a danger to the peace of the world.

## BOOK REVIEWS

**Small Traders and The Law,** by H. Ison Porter, barrister-at-law. Published by Stevens & Sons, Limited, 119 and 120, Chancery Lane, London, W.C.2. Price 4s. 6d. net.

This little book should prove very useful to jobbing foundry concerns of modest dimensions, though the reviewer believes that the author had in mind when writing this book the shopkeeper. To the reviewer, the main interest of the book is the curious admixture of what one can and cannot do in business. Not all the 10 chapters are of equal interest to the "small" manufacturer, and one—that of the Shop Acts—can be skipped.

The section on negligence is quite illuminating, and it would seem that the installation of a booby trap to "nobble" a burglar is illegal. This should not be assumed to be correct, as the reviewer is no expert at reading the law correctly. Unlike most legal books, this one is quite readable, and the reviewer frankly enjoyed reading quite long sections. The standing of the author should guarantee the reliability of the information printed, but, as the law is so tricky, this book should be regarded as an interesting introduction to the subject. V. C. F.

**British Standards for Lifting Tackle.** Edited by A. L. Haas, and published by the British Standards Institution, 28, Victoria Street, London, S.W.1. Price 12s. 6d., post free.

It sometimes happens that copies of books sent to editors of journals for review are not of standard quality, as they are amongst the first off the printing machine. The copy of this book received is a particularly bad example, as the first 26 pages suffer from defective machining as to make it quite difficult to decipher. Generally speaking, the book is a collection of B.S. Specifications, so edited as to avoid constant reiteration of almost standardised phraseology which, *force majeure,* must form part of such documents. As there are about 30 specifications covering the subject of lifting tackle, it is almost an essential to have them all assembled in one book. A useful addition to this collection of relevant specifications is a section covering the statutory requirements. These are not too simple, as it takes 32 pages to detail the requirements. The Institution has certainly covered the subject very thoroughly. As lifting tackle is of major interest to foundry executives, who use every type of rope and chain daily, this book should be made available as a standard work of reference.

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THE "NICKEL BULLETIN" for October, 1946, contains some interesting abstracts, amongst which are articles on electro-deposition, the properties of nickel-iron alloys produced from powder, and resistance of metallic materials to phosphoric and hydrofluoric acids. Copies of the "Bulletin" may be obtained, free of charge, from the Mond Nickel Company, Limited, Grosvenor House, Park Lane, London, W.1.

## DENSITY INDICATOR

A moulding sand density indicator, which shows the weight in pounds per cub. ft. of any moulding material under a degree of ramming compactness that may be chosen, or under an A.F.A. standard sand specimen degree of ramming, has been developed by the Harry W. Dietert Company, of Detroit, Michigan. The density indicator may be attached to any A.F.A. sand rammer by means of two screws. It does not interfere with the other functions of the sand rammer or flowability test. The method of test is very simple. A known weight of the moulding material is placed in a 2-in. dia. specimen tube and rammed, for example, with three drops of the sand rammer weight. The density indicator pointer will show the weight in lb. per cub. ft. for that material when rammed to that specific hardness.

Foundrymen have always evaluated foundry sands by taking a handful of the sand and squeezing it, and then quickly raising and lowering the hand to feel the weight of the sand. It was described as either light or heavy sand. With the density indicator, the exact weight of the sand is precisely determined and daily records may be kept of the exact weight of the sand as used in the foundry. Many sand properties are dependent upon the density of a sand. A technical Paper is to be presented at the forthcoming A.F.A. convention at Detroit, giving specific data on this subject matter. Density of moulding sand is one of the important sand properties that has not been controlled and its variations are causing casting defects.

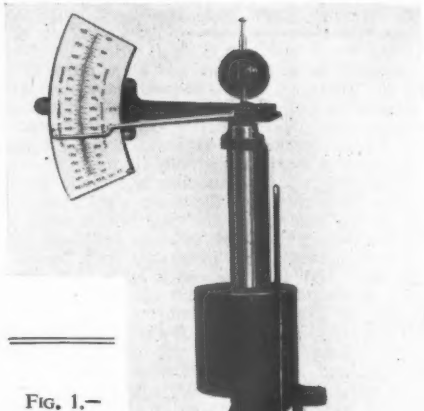

FIG. 1.—MOULDING SAND DENSITY INDICATOR.

## ALTERNATIVE METHODS

By "TRAMP"

Patterns received in the jobbing shop are not always constructed to favour the most suitable method of moulding for the tackle available, and improvisations have to be adopted. Fig. 1 shows a combined fly-wheel and clutch race for use on a power press. The pattern was made in three pieces, A, B and C, Fig. 1 being the main wheel, the clutch race and a part of the centre boss respectively.

The pattern was constructed to cast in the position shown, but it was thought that a better job would result if the job was cast with the heavy portion up and two self-feeding risers placed diametrically opposite each other, as the job was required in a high-duty iron. Consequently the coreprint D was removed and placed on the other boss.

Moulding in a three part box was indicated by the pattern, the necessary joints being taken at E and F. As no suitable middle portion was in stock, an alternative method had to be adopted. This consisted in making the job in a two part box with the portion forming the clutch race as a "floating joint." The method of moulding being to place portion A of the pattern on a joint board and ram up this portion of the mould together with the before-mentioned self-feeders and runner sticks. These are withdrawn and the box rolled over and the top part of the pattern placed in position. The joint is parted and the clutch race built up as X, Fig. 2. This is again parted and

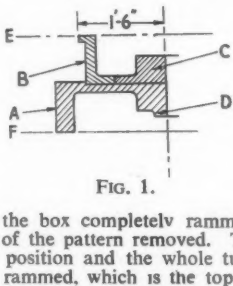


FIG. 1.

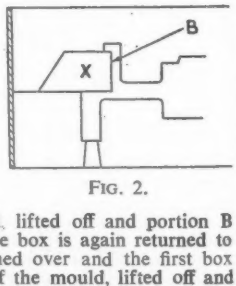


FIG. 2.

the box completelv rammed, lifted off and portion B of the pattern removed. The box is again returned to position and the whole turned over and the first box rammed, which is the top of the mould, lifted off and the pattern withdrawn. The mould being dressed and runners cut, it is reassembled and made ready for casting, in the reverse position to that shown in Fig. 2.

# PERMANENT MOULD GREY-IRON CASTINGS*

By EDWARD C. HOENICKE†

The Foundry Division of the Eaton Manufacturing Company has perfected and is using a machine that produces grey-iron castings in volume in mechanically operated metal moulds without the application of pressure. Thus, it brings to the industry the advantages of machine production. Of even greater importance, however, is the fact that castings produced by this method are superior in several respects. These improvements are due to the rigidity of permanent moulds, the rapid extraction of heat from the castings, and the uniform temperature maintained throughout the mould during the solidification period.

As a result, permanent mould grey-iron castings possess a porous-free structure with sufficient density to hold liquids and gases under pressure in hydraulic and refrigeration units or to contain petrol. In many cases, such castings have replaced brass and bronze satisfactorily.

The absence of surface hardness and scale and the fine-grained, uniform structure of permanent mould grey-iron castings permits easier machining, higher cutting speeds and faster feeds. The saving in machining has been estimated at as high as 15 to 20 per cent. Increased dimensional accuracy also makes it possible to eliminate some machining operations. Growth and distortion are held to a minimum by the uniformity of the metal, making more accurate machining and fitting possible. The fine-grained structure permits surfacing to a mirror finish, if desired.

## Machine Construction

The Eaton permanent mould machine which produces these castings consists of 12 hollow arms mounted in circular fashion and so connected as to rotate about a central pipe which acts as a hub. At the extreme ends of each arm are inner and outer heads. One-half of a mould is attached to the outer head. The other half is fastened to the inner head, which is movable, being actuated by air cylinders to close, hold, and open the moulds. Cooling air passes over both halves of the mould through the hollow arms and into the central pipe, where it is exhausted. On the heads are cams to control the acetylene gas flame that coats the mould with a carbon deposit, and also to turn on and shut off an air current which cleans the moulds of excess carbon and dirt as the machine revolves.

Two men are required in most operations, one to pour the metal, another to remove the finished castings. If the part being cast requires a core, a third man is needed to set it.

Molten metal is brought to the machine by travelling bull ladles, or by whatever other means is convenient for the individual foundry. The rotatable ladle at the machine is filled from the larger ladle, pouring temperatures being held generally to about 1,315 to 1,370 deg. C. Operations at the machine are then ready to commence.

## Cycle of Operations

The mould is poured from the rotatable ladle as the machine slowly revolves. Pouring should be done directly into the down sprue, and any swirling motion of the liquid metal should be avoided as tending to trap air. The top face of the mould must be free from oxide or other foreign material, as this would tend to be carried into the mould.

By the time the fifth arm passes the operator—about 40 to 80 secs.—the metal in the first mould has solidified and cooled. Cams automatically trip the air valve controlling the inner, movable head and its attached half of the mould. The mould is opened, and the casting, cooled evenly to about 370 to 425 deg. C., is removed by the operator at that station with a metal hook.

The remainder of the machine's cycle is concerned with the preparation of the mould for the next pouring. The mould first passes in front of a jet of air that cleans the cavity of any loose particles of metal or other material. It then moves under a smoke hood, where acetylene burners deposit a coating of lamp black over the faces of both halves of the mould. When the casting requires the use of cores, these are placed immediately after the mould leaves the smoke hood. The mould then closes automatically, and comes to the first station again, where another casting is poured.

## Speeds and Temperature

An electric motor driving a ring gear attached to the hub provides the power for rotating the machine. Once started, the operation is continuous, although switches located near the operator make possible emergency stopping. A variable speed reducer on the motor permits any desired speed from one revolution in 2 min. to one revolution in 6 min.

The speed at which the machine travels is set at such a rate that the moulds, which have been preheated to about 371 deg. C., will not cool below 315 to 425 deg. C. during the casting operation. When starting the machine, the cycle time should be reduced until the moulds become heated slightly above 370 deg. C. in operation and then slowed down about 30 secs. per revolution. This is usually the best speed.

Proper control of temperature of the moulds and through them of the castings is very important. Because of the preheating of the moulds, any excessive chilling of the castings is avoided. A rapid and uni-

*Slightly abridged from an article in the October issue of "Materials and Methods."

†General manager, Foundry Division, Eaton Manufacturing Company.

## Permanent Mould Grey-iron Castings

form withdrawal of heat is necessary so that the casting can be removed from the mould within about 1 min. of the time of pouring. Such cooling is also necessary to obtain a uniform distribution of graphite in the casting.

To obtain sound castings, it is important that the charge of the cupola be so adjusted, along with the blast, that the metal at the spout has a temperature of about 1,535 deg. C. and possesses the following composition: T.C., 3.40 to 3.60; Si, 2.40 to 2.60; Mn, 0.70 to 0.90; S, 0.10 (max.), and P, 0.30 per cent. max.

The carbon-silicon balance, and the values for carbon and silicon, are especially important in avoiding shrink spots on the face of the casting.

Grey iron of this composition ordinarily has a tensile strength of about 9 tons per sq. in. and possesses rather high graphitic carbon. When cast into permanent moulds, however, the metal shows tensile strengths in the neighbourhood of 13 to 15 tons per sq. in., and strengths as high as 31 tons per sq. in. have been obtained after heat-treatment. Brinell hardness is in the 170 to 205 range. As with all cast irons, section size has a bearing upon strength due to the finer division of the graphite in smaller sections. The size factor is not as pronounced in the case of permanent mould castings, however, because of the more uniform cooling rates maintained in the moulds.

Deflection under load is unusually high with the permanent mould grey-iron castings. The smaller size of the graphite flakes in permanent mould castings makes them more amenable to heat-treatment, as solution from the graphitic form occurs more readily.

While permanent mould castings do not possess the hard scale ordinarily found on the surface of grey cast iron, an annealing is recommended to remove the strains associated with quick setting of the metal, and also to soften any small spots of white iron that may have resulted from improperly heated moulds or from improper coating. An annealing cycle that has been proved adequate consists of: Heating to temperature of 860 deg. C. in 1½ hrs.; holding at temperature for 20 mins.; cooling in furnace in 1½ hrs.

The moulds themselves are made of heat-resisting cast iron. They are made in four standard sizes, and are interchangeable. Sizes of castings are limited to 12 in. in length or 12 in. in dia., or to 15 to 18 lb. in weight.

### Design Essentials

Design of castings to be produced by the Eaton permanent mould process is basically the same as for other types of moulding, but differs in a few respects. First, it is important to the life of the mould that the casting cavity be as uniform as possible to permit easy ejecting of the casting and to protect the mould from excessive wear. Second, the permanent mould should have a flat parting line. A small amount of taper or moulding draft should be allowed from the parting line to the deeper area at the bottom of the mould cavity.

The walls around the mould cavity must be of the proper thickness to permit rapid and uniform withdrawal of heat from the casting, since heat distribution should be uniform throughout the mould if localised hot or cold spots are to be avoided and long mould life and sound castings are to be obtained. A cavity backing of ¾ in. to 1½ in. is usual.

To assist in heat dissipation, cooling pins about ⅜ in. in dia. cover the back area of each half of the mould. Spacing of the pins is determined by actual experience, number and location being fixed by the need to keep the mould at even temperature.

The down sprue usually divides the mould in the centre, but offset sprues are sometimes used. At the bottom of the down sprue is the runner, in a horizontal plane, and usually extending practically across the face of the mould. A gate, of from 0.045 to 0.0875 in., connects the runner with the mould cavity. One cavity may be used above another in a multiple mould, and the riser from the bottom cavity is the gate for the upper cavity. Risers, shrink bobs, and traps may be located above the top cavities.

The top of the mould is divided into three sections, the centre section forming a pouring basis, and the sections at either side serving as pools for the risers. The top is given a 5-deg. slant toward the centre of the mould, and rims serve to retain the molten metal in each section.

### Venting

As the moulds are not permeable, sufficient vent must be provided through coreprints or in some other way when cores are used. One side of the coreprint should always face the open air. In exceptional cases relief cuts may be made across the face of the mould for gas relief; as these cuts tend to become filled with soot, they are a last resort only. When the core itself is well vented, and made with an open sand, no difficulty should arise. Vent plugs inserted in the mould cavity assist in permitting gases to escape.

All 12 of the moulds used on the machine can be different. The only requirement is that all moulds on the machine at one time have the same cooling rate. To assure mould release, a double coating is applied before the mould is placed in operation, the first application consisting of a refractory mixture painted on to the inner surfaces of the mould. The mixture is composed of fireclay suspended in sodium silicate. Over this is applied a coating in lampblack which is removed automatically by the machine during each cycle of the moulds. The moulds are considered to have life of from 3,000 to 10,000 pourings, if properly designed.

The costs of producing castings by the Eaton permanent mould method are competitive with sand castings when the number of parts is sufficient to justify the investment in permanent moulds. Five hundred parts will usually warrant making permanent moulds.

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MR. L. M. MAIDMAN, secretary of Specialloid, Limited, has been appointed a director of the company.

# BRITISH CAST IRON RESEARCH ASSOCIATION

*Annual report of the council for 1945-46*

The year under review in the 25th annual report of the British Cast Iron Research Association is the first complete year of activity since the end of the war and the change from war to peace conditions has been completed.

### Council and Officers

The annual general meeting took place at the Waldorf Hotel, London, on December 12, 1945, Dr. Harold Hartley, president-elect, taking the chair. The council held four meetings during the year, Mr. P. H. Wilson being elected chairman in succession to Dr. Harold Hartley. The research committee elected Mr. E. W. Colbeck as chairman in succession to Dr. J. E. Hurst and held three meetings. The development committee elected Mr. J. J. Sheehan as chairman to succeed Mr. P. H. Wilson and held four meetings. The external relations committee re-elected Mr. T. M. Herbert as chairman and held two meetings. Four meetings of the executive committee were held, and eight meetings of sub-committee of the research committee, with one meeting of the joint committee with the I.B.F. on malleable castings, and a meeting of the joint committee on moulding sands. The membership of council and committees and sub-committees is substantially as given in the last report.

## RESEARCH

The research programme has been considerably expanded and additions of both staff and equipment have been made. All work connected with war requirements has been completed and the research effort is now entirely devoted to a long-term research programme on fundamental aspects, reviewed by the research committee, and on relatively short-term work reviewed by the various research sub-committees. Fundamental work on the mechanism of graphitisation during the solidification process has been continued and much useful progress has been made. A lengthy Paper, summarising some of the work to date, has been submitted to the Iron and Steel Institute and is expected to be available in January, 1947. Several new graphite structures have been discovered and field tests are in progress to investigate the possibilities of producing these structures in commercial practice. This work has involved the study of the effects of very small amounts of residual elements not normally estimated during chemical analyses. In addition, attention has been devoted to the various carbides which occur in the iron-carbon-silicon system. Related to the investigation upon graphite formation, work has been carried out upon the effect of melting irons of various compositions *in vacuo* and in various controlled atmospheres. The results of this work have been related to the estimation of gas content by the vacuum fusion process. The Association possesses one complete apparatus for the estimation of the gas content of cast iron by the vacuum fusion process, and a further apparatus for the same purpose is under construction. This is also being used for an investigation into the gas content of pig-irons with a view to obtaining an explanation of inherent characteristics of certain pig-irons.

Work upon ladle additions has been continued and an addition has been developed for the production of a controlled, finely dispersed, mottled structure in cast irons by the use of a combined addition of boron and a graphitiser. This work has been reported in the "Journal of Research and Development" (referred to subsequently as the "Journal") for August, 1946. Field tests have been carried out in a number of foundries using this process which has been made the subject of a provisional patent specification.

### Work on Malleable

Fundamental work continues upon the formation of graphite during the malleablising process by use of the dilatometric method. Three highly sensitive dilatometers have been constructed with elaborate precautions for temperatures and atmosphere control. Also related to the production of malleable cast iron, fundamental work has continued upon the process of gaseous decarburisation in various gaseous atmospheres. Particular attention has been paid to the influence of water vapour. An investigation upon the influence of residual elements on the annealability of blackheart malleable cast iron has been completed and reported to the Ministry of Supply. Further work which has been carried out upon malleable cast iron includes factors affecting the life of annealing cans, the manganese-sulphur ratio in whiteheart malleable cast iron; analyses have been made of the gaseous atmosphere in various types of annealing furnaces used in the malleable iron industry.

In order to satisfy the requirements of the metallurgical aspects of the research programme, and also to meet a long-felt need, work has continued on the estimation of small amounts of the rarer elements in cast iron by chemical means. This involved considerable use of the Spekker photo-electric absorptiometer. Some of the methods which have been developed have been described in the "Journal" for April and June, 1946. The application of spectrochemical methods to the analysis of cast irons has been continued and many refinements have been added to the technique which promises to be of great importance to the future of technical control in the ironfounding industry.

The metallographic study of minor phases in cast irons has been continued and a report has been presented to the Iron and Steel Institute upon the sulphides in alloy irons. A further report has been prepared, and will be available shortly, upon the mode of occurrence of small amounts of tellurium in cast

## British Cast Iron Research Association

iron, now used commercially. The work upon minor phases has been assisted considerably by the use of the metallurgical polarising microscope. Considerable progress has been made in the application of this instrument which is now in almost routine use in the metallography laboratory.

### Firebars

In an endeavour to improve the heat-resistance of firebars and other castings made from light castings mixtures, an extensive investigation has been carried out upon the possibility of using small ladle additions for this purpose. A report with recommendations has been made to the light castings sub-committee and various field tests have been carried out. This report will be available to members shortly. Further work upon the same subject has been begun.

In connection with the production of high-duty irons, an extensive investigation has been completed on the influence of vanadium. A report giving the results of this work will be published in the "Journal." Further work upon high-duty irons has included a study of the influence of aluminium in the nickel-molybdenum acicular cast irons, and also the influence of small amounts of lead and antimony. Work upon the special mechanical properties of cast iron has been continued. Fatigue tests are being made and work upon the creep-testing of cast iron has progressed. The mechanical properties of ingot mould material at elevated temperatures have been studied and work is being continued. Other special properties which have been studied include torsion, compression, shear and ring testing. Apparatus has been constructed for an investigation into the properties of cast iron at sub-zero temperatures, for refrigerating plant and use in cold climates. In addition to this, a survey has been made of the mechanical properties of white irons of various compositions. This has included a study of stress-strain curves for these materials. An investigation upon the relief of stresses in cast iron has also been begun.

A programme of work upon the corrosion of cast iron has been developed and a new staff appointment has been made for this work. A report was issued in the "Journal" for December, 1945, on the graphitic corrosion of cast iron.

### Sand

Experimental work upon sands has been continued and reports have been issued on the recovery of sand from oil-bonded cores and on the selection of coal dust for moulding sands. A fundamental programme of work upon sands has been started and a new staff appointment has been made for this work. Apparatus has been constructed for the study of stress-strain relationships of sand test-pieces in the compression test.

Not the least part of the effort of the research section of the staff is devoted to the construction and examination of new equipment. Much new equipment has been added to that already existing in the Association's laboratories, including a 50-ton universal testing machine, a ring-testing machine, a cutting-off machine for hard materials, and also lighter equipment such as two new microscopes and much vacuum equipment. In addition, several new temperature controllers and recorders of the highest sensitivity have been installed and are now working. The Association has acquired a cathode ray oscilloscope which is to be used for the rapid study of the magnetic properties of cast iron. Several highly sensitive electronic temperature control units have been constructed. Apparatus for the determination of thermal conductivity has been built and many new laboratory furnaces of different types have been built and installed.

The research work of the Association is under the supervision of Mr. H. Morrogh, research manager, who, during the year, acted as leader of a team visiting German malleable foundries. The details of the chemical research programme have been under the supervision of Mr. W. Westwood, and the details of the work on sands under the supervision of Mr. W. B. Parkes. As for the previous year, this programme is based upon the fundamental requirements of the industry, shown in the form of long-term fundamental research, and also the requirements of each of the major sections of the industry—engineering castings, light castings, malleable castings, white and chilled castings. The programme of research is under constant supervision and subject to modification according to changing conditions in the industry. Members are invited to examine this and make further suggestions on subjects of interest to them.

### DEVELOPMENT

The number of inquiries dealt with by the department, including the Scottish Laboratory, totalled 1,514 during the year under review. Major problems totalled 604, the remainder being treated on the basis of laboratory tests. Whenever the problem demands it, a visit is made to the foundry concerned by a member of the staff. The number of such visits during the year rose to 146, involving 126 foundries, in spite of the fact that during the first half of 1946, three members of the staff of the department were abroad for considerable periods. Dr. Angus and Mr. W. B. Parkes were members of a team sent to examine German foundries and Mr. W. J. Driscoll accompanied the Director on an extensive tour of foundries and related organisations in the U.S.A. Reports embodying observations made during these visits are in preparation.

A programme of regular routine visits to members' foundries has been begun in addition to those made in connection with specific inquiries and is enabling the department to assist in the practical application of improvements or discoveries resulting from research work carried out in the laboratories.

A recent investigation conducted by the research department on the production of a cast iron with a disseminated mottle structure is in process of development and is of interest to members concerned with the production of wear-resisting castings with relatively high strength. The application of this is now practicable.

A systematic collection and correlation of statistical data on the warping and cracking of light castings, based on the experience of a number of foundries has been carried on during the year, and it is hoped to establish relations from the completed records which will be of value to the industry.

### Carbon Monoxide Fumes

A preliminary report has been made on the industrial hazards attached to the use of mould driers evolving carbon monoxide fumes. It was found under normal conditions that such risks are slight, but work is continuing to ascertain the worst likely conditions. The effect on industry of the reduction in supply of linseed oil to foundries was discussed at a joint meeting of the development committee and the sands and refractories sub-committee, at which representatives of the Ministries of Food and Supply were present. The quantity of linseed oil allocated to foundries has been increased, but the supply position is still acute and the greatest possible economy will be necessary for some time. Representations were also made to the Ministry of Labour and National Service concerning the draft regulations controlling the use of parting powders and parting sands. The existence in Scotland of a deposit of red sand suitable for use in foundries was confirmed. The possibility of providing suitable standards for a specification on foundry cokes is under consideration and a preliminary survey has been made.

During the war period relatively few new cupola furnaces were installed in ironfoundries in this country. Under present conditions, however, an increased interest is being shown again in the balanced-blast cupola. Even during the war, new installations were proceeded with overseas, mainly in the U.S.A. and in Australia, with the result that there are now 313 furnaces in operation, with an aggregate hourly capacity of 2,415 tons. These figures may be compared with the last figures which were published of 211 cupolas with an hourly output of 1,550 tons.

The engineering uses division continues to give advice to engineers and designers on the applications and properties of cast iron in engineering and industry. The section on cast iron in Kempe's "Engineers' Year Book" has been completely re-written, and it is hoped also to bring up to date certain obsolete information on the subject in other engineers' hand-books.

The Association has actively participated in the work of the British Standards' Institution, of whose main committee in cast iron, the Director is chairman. Revisions of both grey-iron and malleable cast-iron specifications are in progress.

### Building Uses

In this, its second year, the building uses department has dealt with nearly double the number of inquiries that were received in the previous twelve months. These inquiries have come from architects, surveyors, builders, engineers, industrial designers, Government departments, commercial firms and students, and have included a number of requests for information from overseas.

In April, 1946, the Director gave a lecture, "Cast Iron in Contemporary Building and Engineering," to the Royal Society of Arts. The department has been represented on various B.S.I. committees dealing with cast iron in building, and on the sub-committee of the corrosion committee of the Iron and Steel Institute. Work on the problem of atmospheric corrosion of cast-iron building equipment is being carried out in conjunction with the chemical research department.

### Laboratories

The various laboratories conducting regular tests fall within the research department, but serve research and development departments alike. The amount of work passing through the laboratories reached exceptional figures during the war; for example, 56,300 tests in all laboratories, chemical, microscopic, mechanical, physical and sands, in 1943-44, and only slightly less for 1944-45. The change brought about by the reduction of war work has influenced the figures considerably. While, however, the total number of tests carried out has fallen, it is still double the pre-war maximum, and the work is approximately evenly divided between the research and development departments.

In March, 1946, Mr. J. R. D. Howie succeeded Mr. W. L. Proctor as acting superintendent of the Scottish Laboratory, in the absence on sick leave of Mr. T. Tyrie, who continues to make good progress. The Scottish section of the light castings sub-committee has been very active and the work of the laboratory well maintained.

### Intelligence

During the preceding year the department has dealt with 238 inquiries from members. In addition the department has frequently been visited by members of other associations wishing to obtain full information regarding methods of working.

The number of Press notices has shown a steady increase—272 during the period under review—in number and in length.

Accessions to the library include: books, 121; periodicals, 28; and pamphlets, 485. Loans made comprised: books, 524; periodicals, 1,395; pamphlets, 309; and lantern slides, 34.

### Finance and Membership

The year under review was the first of a new agreement with the Department of Scientific and Industrial Research and of a new subscription scale. During the five-year period thus introduced, the Association has the opportunity of raising an income of £45,000 per annum, £9,000 by way of block grant on £18,000 subscription income and up to a further £9,000 by way of supplementary grant on a further £9,000 subscription income, or £18,000 for £27,000 of industrial income, totalling £45,000. The actual grant earning income approached £22,000, which, with grant, totalled £34,800, and the total income for the first time exceeded £40,000. The council is deeply grateful to members for the response which made this possible. The indications for the current year are actually less favourable, mainly

(*Continued on page* 380, *column* 2.)

## BRITISH FOUNDRYMEN VISIT BIRMINGHAM, ALABAMA

Mr. H. H. Berresford, managing director, and Dr. J. E. Hurst, director of research, of the Staveley Coal & Iron Company, Limited, Chesterfield, during their visit to the United States not unnaturally visited Birmingham, Alabama, as the American Cast Iron Pipe Company are located in that city. Also, both this company and the visitors have a common interest in the perfection of the centrifugal pipe-making process. Both the visitors accepted an invitation to address the Birmingham district chapter of the American Foundrymen's Association. This function took place on November 8 at the Tutwiler Hotel. After a dinner costing $2.25 "per plate," a record gathering assembled under the chairmanship of Mr. T. H. Benners. Mr. Berresford was introduced by Dr. J. T. MacKenzie, who is both well known and much liked in British foundry circles. Dr. Hurst, who was introduced by Mr. W. O. McMahon, suggested an exchange of technical Papers between his hosts and the Birmingham branch of the Institute of British Foundrymen. Mr. Berresford dealt with the decline of coal production in Great Britain, and Dr. Hurst, with wartime foundry activities. We reproduce photographs of the guests taken in the works of the A.C.I.P. Company.

*Dr. J. E. Hurst preparing the notes for his address to the Birmingham chapter of the A.F.A.*

*Mr. H. H. Berresford finds time to read home news from the* FOUNDRY TRADE JOURNAL.

## CONGRATULATIONS!

The Northampton Polytechnic, London, E.C.1, is throwing open its extensive and well-equipped laboratories to public inspection to-morrow (Friday) from 3.30 to 9.30 p.m., to mark the 50th anniversary of its establishment. Now catering for well over 4,000 students, it ranks amongst the technical educational centres of the metropolis.

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HEYES & COMPANY, LIMITED, electrical engineers, of Wigan, announce that their London office is at 21, Fitzroy Square, London, W.1. (Telephone: Euston 6722.)

## CORRESPONDENCE

*[We accept no responsibility for the statements made or the opinions expressed by our correspondents.]*

### SUPPLY OF BATHS

*To the Editor of the* FOUNDRY TRADE JOURNAL.

SIR,—Mr. Shirra, in his presidential address to the annual meeting of the British Federation of Plumbers' Merchants' Associations, devoted a considerable part of his remarks to the question of the availability of baths to meet the Government's temporary programme and merchants' requirements under the W.B.A. scheme.

I do not join issue with Mr. Shirra in the figures he quotes, nor is it my intention to be controversial on the question of the shortages to which he makes pointed reference. Suffice it to say that at no time, in spite of official and other Press statements to the contrary, has there been any danger of houses, temporary or permanent, remaining uncompleted because of a shortage in production of baths. The number of baths supplied under direct contract with the Government has at all times been in excess, and at certain times substantially in excess, of the number of temporary houses completed according to the officially published figures, and there has in addition been a substantial number of baths which has been passing through the ordinary channels of the merchant trade.

Mr. Shirra in his address was, however, dealing with the position as it was nearly six months ago. It is not on the past, but rather on the present and the future that I desire to concentrate. Baths have for too long been the stalking horse for much uninformed and inaccurate criticism, and it is, therefore, due to British makers that the present and future position should be made clear.

At the present time British manufacturers are producing in excess of a rate of 300,000 baths per annum (approximately 27,500 baths per month), which means that for the months of November and December there will be available for all purposes, 55,000 baths. Of this number, approximately 15 per cent., or 8,000 baths, are reserved for direct Government contracts for the temporary housing programme, including aluminium houses.

A further 15 per cent. will more than cover the total demands under the W.B.A. super priority "finish the houses campaign," with an additional 15 per cent. for steel houses during these months. There will, therefore, be a balance of not less than 55 per cent. of total output, or 30,000 baths available for normal W.B.A. trade during November and December, 1946. As all baths with the exception of those delivered under direct contract are marketed through merchants, it will be seen that approximately 85 per cent. of total current production or, say, 47,000 baths, will be disposed of through merchants during these months—a notable improvement on the position described by Mr. Shirra in his address. That is not, however, the complete story, as the position will show a further substantial improvement during 1947.

The total requirements of the temporary housing programme, including aluminium houses, are now known and all deliveries against these requirements should be completed by the end of July, 1947. The increase in the production of British makers is improving month by month, and on a conservative estimate there should be no difficulty in reaching a total output during 1947 of 400,000 baths.

During 1947 the total demand on output to meet direct Government contracts for temporary houses should not exceed 40,000 baths, or 10 per cent. of total output, and permanent prefabricated steel houses will, it is estimated, require another 5 per cent. If for the sake of being safe in our estimated figures we assume that the demand for the permanent prefabricated steel houses reaches a figure as high as 10 per cent., we are still left with 80 per cent., or 320,000 baths, which will be available to meet W.B.A. priorities during 1947, and all of these will pass through the merchant trade. This figure approximates very closely to the total of 350,000 annual bath purchases from British makers in the years immediately preceding the war.

The figures of estimated production for 1947 which I have quoted are, of course, contingent on there being no major stoppages or other undue interference with production during the year. I hope that the foregoing summary of the present and future position will assist in removing any apprehension which may exist as to the ability of the British bath industry to meet its commitments both now and in the future.—Yours, etc.,

W. R. BLAIR,
Chairman, British Bath Manufacturers' Association.

145, St. Vincent Street, Glasgow, C.2.
December 3, 1946.

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## STANDARDISED SLUICE VALVES

A revised standard, B.S. 1,218—1946 (first published 1945) includes reference, where necessary, to B.S. 534—Steel spigot and spigot pipes. In addition to the previous adaptors, a new table is included for cast-iron adaptors to accept the sockets of steel spigot and socket pipes B.S. 534. Small corrections have been made to the foreword, and a previous amendment to Table IX has been incorporated.

The standard deals with double-socketed and double-flanged sluice valves, 2 to 12-in. nominal diameter in two classes, for 600-ft. and 800-ft. head test pressures. Double-socketed valves are for use with spigot and socket pipe, the double-flanged valves are for use with flanged pipes and, with the specified adaptors, for use with spigot and socket pipes. Dimensions are external, but spindles, nuts, caps and hand-wheels are dimensioned in detail. The required qualities of cast iron, bronze and gunmetal are laid down. Closing is specified to be clockwise. Jointing and packing as well as testing procedure are specified.

Copies of this British Standard may be obtained from the Publications Department, British Standards Institution, 28, Victoria Street, London, S.W.1. Price 2s., post free.

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THE HOFFMANN MANUFACTURING COMPANY, LIMITED, have opened a new branch office at 59, Queen Square, Bristol, 1.

## A GARGANTUAN DOOR
### LARGEST IN THE WORLD?

What is claimed to be the largest door in the world will shortly be fitted to the new aircraft assembly hall at Filton, Bristol, which has been built to house the Brabazon Mark 1 aircraft. It is the first all-aluminium door to be used for this type of construction. This door has been designed and supplied by Esavian, Limited, in collaboration with the Northern Aluminium Company, Limited; its completion will mark a new stage in the employment of light alloys for engineering projects.

The main problem was to enclose an opening 1,045 ft. long and 65 ft. 9 in. high; at the same time allowing for a vertical head movement of 18 in. (due to possible deflection of the hangar roof under extreme weather conditions) and for the flexibility of the vertical structure. It was necessary, also, that there should be three separate openings of 345 ft. wide, providing a bay for detail erecting, a bay for final assembly, and a port and servicing bay.

It was essential to employ a material combining qualities of strength and lightness (to permit the rapid opening and closing of the doors), which would be sufficiently weather resistant. and proof against corrosion, to cut maintenance to a minimum. The actual alloys used were: extruded sections for framework and uprights, Noral 51S.; sheet for panelling, Noral 57S.; and castings, Noral 350. It is interesting to record that the total weight of castings involved is 10 tons.

**Carried on Wheels**

Each section consists of a series of 32 leaves, 65 ft. 9 in. high by 5 ft. 6 in. wide, and of double thickness; the leaves are hung in pairs on self-aligning hinges which, in turn, are bolted to a sliding upright, carried on its base by specially designed taper, roller-bearing wheels, running on a strong double track. These sections open and close under their own electrically operated motive power, moving at a rate of 80 ft. per min. They are unattached, and can open from the ends or from the centre, stopping at any point. The entire door weighs only 200 tons, and can be thrown open in the record time of two minutes.

Every panel is lined with fireproof insulation board; wicket doors are fitted in a proportion of the leaves, and in all others a glazed panel is inserted at eye level. An aluminium paste spray is applied externally to give a satin-aluminium finish. This door is not only a considerable achievement in engineering design and practice, but architecturally, too, it contributes to the dignity of line which is the keynote of the whole structure.

## NOTES FROM THE BRANCHES

*LONDON.*—The hon. secretary (Mr. F. Arnold Wilson, Wm. Jacks & Company, Limited, Winchester House, Old Broad Street, London, E.C.2) announces that he still has a very few tickets available for the annual dinner, which is to be held on Friday, December 20, at Pimms Red House, Bishopsgate, London, E.C.2, at 6.30 p.m.

## ITALIAN WORKERS FOR BRITISH FOUNDRIES
### FROM THEIR ANGLE

*(By an Italian Correspondent)*

The engagement of Italian foundry workers by the British foundry industry, the rumours concerning which have been circulating for some time, is now an accomplished fact. Thus, the friendly collaboration between England and Italy is now also extended to the field of labour to the great relief of Italian workers who ask for nothing better than jobs which would allow them to live and to maintain their families.

The terms of the agreement which regulates this engagement are very interesting, as they grant to the Italian an absolute parity with the British worker, and thus Italian labour is considered at its proper value. The fact of its being superfluous in Italy has not led to any indecent exploitation.

The essential points of the agreement are as follows:—

(1) Italian workers will receive in England the same treatment as the British as far as wages and social insurance are concerned. Immediately upon their arrival they will join the British trade unions, which will see to their interests. They will also be granted the same lodging facilities as the British workers.

(2) Italian workers will be guaranteed a minimum of three months employment. There will be an engagement indemnity.

(3) Italian workers will be permitted to send their savings to Italy. The amount of these savings is limited to £5 monthly in the case of unmarried, and £10 for married workers. The official rate of exchange of 900 lire per pound will be adopted.

(4) Travelling expenses will be charged to the British Government.

**Health Stipulation**

The agreement furthermore stipulates that all the workers engaged should be of healthy physical constitution and envisages the temporary invitation to England of representatives of the Italian Federation of Labour.

The engagement of these workers will be effected exclusively through the provincial labour exchanges in Italy. The first contingent of Italian qualified workers is expected to leave for England at the beginning of January.

It is hoped that this first experiment will result in satisfaction to both parties concerned and that it will be followed by other groups of foundry workers. Should this venture be a success it will be undoubtedly imitated by other industrial branches in the United Kingdom which happen to suffer from the shortage of labour Thus this agreement presents an interest far beyond its immediate consequences as it opens a possibility of increasing greatly the collaboration between the two countries to their mutual advantage.

[Mr. P. L. Gould, on behalf of the Ministry of Supply, and Mr. W. Wallace, of the Amalgamated Union of Foundry Workers, are now in Italy on a recruiting campaign.—EDITOR.]

## NOTES FROM THE BRANCHES

*SCOTTISH.*—There was a record attendance at the meeting held in the Royal Technical College, Glasgow, recently. Mr. Tom Shanks, branch-president, was in the chair. The branch, he said, had been fortunate in having obtained permission to see the film "Sand Storm Secrets," which had been prepared by Mr. J. B. Blakeborough, M.A., M.I.Mech.E., Brighouse. Unfortunately, Mr. Blakeborough was unable to come to Glasgow, but Mr. Campion had kindly agreed to deputise, and to introduce the film.

At the outset, Mr. Campion said he had previously seen the film, which dealt with "The Basic Principles of Core Blowing," and he assured the members that the work done by Mr. Blakeborough was of very great value. In the foundry with which Mr. Blakeborough was connected, a large proportion of the cores are blown and, in common with others, certain types of core were found difficult to produce. Modifications had been made to the core boxes and to the core blower; alterations had been made in the sand characteristics, but none of the changes had enabled them to get cores that were considered satisfactory.

The results seemed to indicate that the problems involved in core blowing were not fully understood, and a desire to solve these problems provided the incentive to examine the work of core blowing more thoroughly. The time taken to blow a core was so short that sequence of operation was not apparent. An ordinary slow motion camera was also insufficient for clear observation. It was, therefore, decided to employ one of the new Eastman high-speed cameras, which can photograph at the rate of 3,000 frames per sec., and the Kodak research laboratory was approached and willingly co-operated.

To obtain data from which a theory could be derived from first principles, the shapes of core boxes were selected as far as possible on basic designs. The cores were blown in boxes unvented, with the positions and the numbers thereof, varied in regular sequence. Obstructions such as wires and supports, etc., were inserted. The characteristics of the sand and air pressure were maintained constant. In addition, to study the effect of the external causes, two basic designs of core box were selected, the sand characteristics being varied in one set of experiments with a pressure constant and in the other using standard sand, the air pressure varied with the standard nozzle and the nozzle size varied with air pressure standards. Finally, a series of runs was made in which the standard sand and air pressure were maintained and a number of unusual shapes were blown.

### Method of Presentation

The film was presented in a logical sequence with each shot preceded by a short commentary, together with information regarding sand characteristics, air pressure, ambient temperature, etc. The film was a complete record of the experimental work, the methods of procedure, the actual shots and the conclusions drawn from the investigation. For the type of core blower employed, the action of the sand stream is entirely different from previously accepted theory. The behaviour of the air-borne sand from a core blower is similar to that of a very viscous liquid. The function of the vents is confined to control of the air affecting the speed of the sand streams, but not the direction. It is difficult to deflect the sand through angles larger than 90 deg. Ample air supply, both pressure and quantity, is necessary. The size of blower nozzle must be in relation to the smallest passage in the direct line of the sand stream. The green strength of sand must be the lowest that will permit of satisfactory handling.

Acknowledgment is due to the staff of the Kodak research laboratory for enthusiastic assistance—particularly Mr. G. H. Jones and Mr. D. Stewart, who respectively acted as producer and camera operator; to Mr. L. H. Fairbank and the staffs of pattern shop and foundry of J. Blakeborough & Sons, Limited, for co-operation in the manufacture of core boxes, as well as performance of ancillary parts of the experiment and observations.

At the termination of the film, Mr. Shanks expressed the thanks of the branch to Mr. Campion for the manner in which he had presented the facts of the circumstances under which the film had been prepared. He agreed that the film had shown that many of his pre-conceived theories about core blowing were wrong, and to get good results the size and position of core box vents would have to be considered anew. This, he thought, would be the view of most of the members who had any experience of core blowing. He wanted to express, also, the thanks of the branch to Mr. Blakeborough for the excellent work he had done and for so kindly permitting the branch to see the film.

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*FALKIRK SECTION.*—The opening meeting of the section was held as usual in the Falkirk Temperance Café. Mr. T. R. Goodwin presided at the outset, and introduced Mr. W. Montgomery, who had been elected president for 1946-47.

In his brief presidential address, Mr. Montgomery referred to the wealth of knowledge resulting from investigation and effort in workshop and laboratory during the war years. These data were all put on record in the proceedings of societies and research bodies all over the world. The Institute of British Foundrymen ranked foremost in such matters connected with all aspects of foundrywork. Mr. Montgomery pointed out that the responsibility of recording contemporary foundry achievements rested with the members.

Apprentices should be encouraged to attend meetings, while the older members should come forward with Papers on subjects which experience had fitted them to present. Above all, members should support all meetings, not only those on which there was a subject to their particular liking.

Mr. Montgomery concluded with a quotation by Bacon:—"Some books are to be tasted, others to be swallowed, and some few to be chewed and digested." He ventured to suggest that the Proceedings of the Institute of British Foundrymen fell into the last category.

Thereafter, a Paper was read by Mr. Dan Brown, of Edinburgh, which will appear in a future issue of the JOURNAL. After Mr. Brown had concluded his talk, the CHAIRMAN offered his appreciation of the speaker's treatment of his subject.

The section was honoured on this occasion by the presence at the meeting of Mr. Tom Shanks, Scottish branch president, who addressed a few words of appreciation to the speaker, and encouragement to the section.

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The second meeting of the session was held in the Temperance Café on November 29. MR. T. R. GOODWIN, hon. secretary of the section, presided over the early part of the meeting due to the president being delayed, and had very regretfully to inform the members and visitors present, that the intended speaker had been delayed in Holland, and as he (the secretary) had only had a few hours' notice, no substitute could be found. Accordingly, he proposed that the meeting should become an open discussion on all subjects relative to the foundry industry.

By this time, MR. MONTGOMERY, the section president had arrived and took over the chair.

MR. MCINTOSH posed a question relative to the positioning of bars in moulding boxes for use with a heavy type of moulding machine, and in answer, several members quoted distances of five or six inches between the bars. Mr. Goodwin commented that it was of necessity a function of the quality of sand being used. Another question was asked on the possibilities of the conservation of core oils by spraying the surface of cores only and thereafter skin baking. On this point very few members saw any likelihood of success.

Infra-red drying in core production was discussed, a visitor quoting from his own experience in discounting any likelihood of success with this method, due to the fact that radiation from the lamps was not sufficient to bake the cores. Methods of ladle drying and heating were discussed, as well as the use of the metallisation process of rust prevention. Another visitor quoted as a point of interest, how he had found that castings in Alpax alloy had successfully resisted corrosion. This was in answer to a member's query as to how to prevent aluminium plates from being wasted by corrosion.

After other questions the chairman declared the meeting closed.

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## HOUSE ORGAN

*C.F.A. Bulletin for November.* Issued confidentially to members by the Council of Ironfoundry Associations.

This issue contains a short report of the convention of the Joint Iron Council, and gives information on labour deferments and the 1948 call-up. There is an appeal for the foundries to support the classes preparing students for the pattern-making and foundry practice examinations organised by the City and Guilds of London Institute. Other subjects covered are workmen's compensation under the various industries; silicosis amendment scheme of 1946; the shortage of plaster of paris, and E.P.T. refunds for industrial development.

## BRITISH CAST IRON RESEARCH ASSOCIATION

(*Continued from page* 375.)

on account of the fall in non-grant earning income, following the completion and cessation of war contracts. Nevertheless, this can be more than made up for before the grant ceiling is reached, £5,000 per annum in new subscriptions can in the aggregate earn a further £5,000 per annum. The number of ordinary and trade members at the close of the year was 485.

### Relations with Other Bodies

Co-operation has been maintained with a number of scientific and technical bodies. The Association also co-operated fully with the Joint Iron Council and took an active part in the discussions on and preparation of the Report on the Iron Industry presented by the Joint Iron Council to the Minister of Supply and Aircraft Production and subsequently issued, with the Report on the Steel Industry, by H.M. Government as a White Paper.

At the invitation of the British Intelligence Objectives Sub-committee the Director acted as leader of a team visiting German metallurgical and research institutions in October, 1945, and made arrangements on behalf of the Council of Ironfoundry Associations for the teams which visited German foundries early in 1946. Dr. H. T. Angus acted as leader of the light castings team, which also contained Mr. W. B. Parkes, while Mr. H. Morrogh acted as leader of the malleable team. Other teams were concerned wtih engineering castings, led by Mr. R. C. Shepherd, and with centrifugal castings, led by Mr. M. M. Hallett. The report of the Director's team has been issued by H.M.S.O. (B.I.O.S. Report No. 676), and the remainder are in preparation or in course of publication.

### Conclusion

Progress which has been made in the laboratories in work resumed after the long gap caused by the war, suggests that no foundry can fail to be affected by the results. The adhesion of foundries not yet members would go far towards alleviating the urgent needs of the Association for funds to press these developments to their logical conclusion and to establish British priority for them.

The report is signed by Mr. Harold Hartley, president; Mr. P. H. Wilson, chairman of council; and Mr. J. G. Pearce, Director and secretary.

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THE ATLAS STEEL FOUNDRY & ENGINEERING COMPANY, LIMITED, propose to convert the £75,000 of ordinary shares into stock and sub-divide into units of 5s.

ACCORDING TO A NOTE printed in the November bulletin of the Council of Ironfoundry Associations, the labour intake into the ironfoundry industry has, during the last 12 months, been of the order of 25,700.

MR. E. G. HOWELL has been put in charge of the ferrous scrap works-to-works trade for the southern region of the raw materials division of George Cohen, Sons & Company, Limited. He has recently returned from the Forces.

# JOHN WILKINSON AND BERSHAM

By RAY HUGHES

Bersham Foundry, Wrexham, is just starting on another phase of its chequered existence, having celebrated the changeover to peacetime production by reconstruction, which will enable its workers to produce much-needed machine-tool castings for agricultural purposes. This process of reconstruction may bring about much change, but it is doubtful whether it has caused such a revolution in the history of Bersham as when John Wilkinson took it over in succession to his father, Isaac, who had come there from Lancashire in 1753.

As far back as 1740, Isaac Wilkinson, assisted by his eldest son John, had started work in the little village of Backbarrow, near Coulton-in-Furness, where, with no furnace of their own, they began the manufacture of flat irons, carrying their melted metal across the road from another furnace in the village. Eight years later they were flourishing enough to open up an iron furnace and foundry of their own at Wilson House, Cartmel, where, to convey peat for melting the iron ore along a canal excavated by their own labour, they evolved a little iron boat, "forerunner," according to a Cymmrodorion Society Paper (Session 1897-8), "of all the mighty iron ships yet to be invented." At Cartmel they brought out a patent for "the common box smoothing iron," having recourse to charcoal when they found peat unsuccessful for melting their ore.

### Bilston's First Blast Furnace

John now left his father, proceeding first to Wolverhampton, then to Bilston, where after 10 years he had gained enough experience and saved enough money to build the first blast furnace in that place. Here he changed to mineral coal instead of charcoal for the smelting of iron ore.

In the meantime, his father had taken the lease of the Bersham Iron Furnace, one of the oldest foundries in North Wales, iron having been smelted there as early as 1720. Here he turned out sugar rolls, maltmill rolls, calender rolls, box-heaters, pipes, shells and guns. In spite of having prospered enough to rent a small country seat from the local squire, Isaac Wilkinson did not make a real success of his new business venture.

It was at this juncture that John, who had kept in constant touch with his father, stepped in, taking over the Bersham works about 1762 and floating a company with his brother William. He soon saw that there was not sufficient water power to work his furnace, and proceeded to remedy this by renting or buying all the mills along the near-by river Clywedog.

### Watt's Steam Engine

From about 1775 he supplied James Watt with cylinders of a high standard, and so was able to profit by the use of Watt's steam engines, thus becoming, after all, independent of water power.

At the close of the Seven Years' War, in 1763, John and William Wilkinson were producing large quantities of cannon and other munitions. Five years later, when Russia and Turkey were at war, they got into bad odour through supplying both sides with armaments, the same charge being brought against them during the American War of Independence. William Wilkinson certainly had a contract with the Paris Waterworks Company for supplying them with iron pipes, and it was suspected that cannon balls and other munitions found their way under this cover to the French, then allied with America. Later, during the Napoleonic wars, they were again accused of trafficking with the enemy in armaments.

John did not live to the end of the war with Napoleon, and shortly before his death the occasional quarrels with his brother burst into open enmity. William, in all probability jealous at his exclusion from partnership in his brother's new works at Brymbo, about three miles away, proceeded to Bersham works with some friends, and smashed all machinery "within reach." John, losing all self-control, followed with a larger body of men and destroyed all that was left. Thus, in this drastic fashion, was severed the brother's partnership at Bersham.

Though not uniquely interested in the Bersham foundry, having other estates which he had developed, John Wilkinson undoubtedly had the stronger personality, and left his mark on its progress.

While he was well-hated by some, this somewhat grim character had, nevertheless, sterling qualities. He was generous in the extreme to relatives who had suffered reverses, and also to his employees, pensioning them off when they were too old to work, at a time when no Old Age Pension had come into force—this in direct contrast to many ironmasters of those days who would not have dreamt of providing security for their workpeople.

Of his vast undertakings, "European in their scope," as Dodd says in his "Industrial Revolution in North Wales," only the Brymbo works kept on an active existence after his death, Bersham relapsing into its former tranquillity.

### Epitaph

The epitaph John Wilkinson hoped to have placed on his tomb is interesting in view of the fact that although an acknowledged Presbyterian, he seldom, almost never, attended church. It reads: "Delivered from Persecution of Malice and Envy Here Rests John Wilkinson, Iron Master. In Certain Hope of a better Estate and Heavenly Mansion as promulgated by Jesus Christ in whose Gospel he was a firm Believer. His life was spent in action for the benefit of man, and he trusts in some degree to the glory of God."

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THE ANNUAL REPORT of the Industrial Welfare Society states that over 207 conferences have been held during the year, which were attended by some 1,900 delegates.

*Company Meeting*

# HALE & HALE (TIPTON), LIMITED

## MR. W. EDGAR HALE'S REVIEW

The tenth annual general meeting of Hale & Hale (Tipton), Limited, was held on Monday, December 9, at Dudley, MR. W. EDGAR HALE, M.I.Mech.E., M.Inst.F. (the chairman), presiding. The following is an extract from the chairman's review of the company's activities for the year ended August 4, 1946:—

The year under review has been one of exceptional complicacy for the management, but the position in this connection has been no different from that experienced by the vast majority of industrial undertakings, although we had, virtually, no change-over problem. The demand for our products has been immensely in excess of our ability to supply, which position again has been experienced by almost all industrial concerns of repute.

However, in our own case, I feel that this position has been somewhat more acute, due to the fact that our standard of quality of fine blackheart malleable-iron castings is so high that existing, and many would-be customers, would like to place far more business with us than we are able to undertake. In addition, it has to be borne in mind that we pride ourselves on giving an ever-improving general service to our customers.

### Production Difficulties

Unfortunately, our production problems are not easily overcome by the introduction of more mechanical facilities than we have at present. This problem, however, is continually before the minds of the management, and actually at the moment far-reaching schemes are the subject of analysis and investigation. Our real difficulty, of course, on the production side, is lack of knowledgeable employees. This again is a more or less universal problem and, unfortunately, one that is being aggravated by a tendency for employees to transfer from one works to another, due to less far-seeing firms offering somewhat irrational bonus systems, and the like, which can only be shortlived, though the cost can so easily be passed on to the consumer in a sellers' market such as exists at present.

However, this is a state of affairs which has not seriously troubled the management, and they are already fully satisfied that employees are finding these apparently attractive bases of employment are not, in fact, what they appear to be on the surface. Indeed, the more enlightened artisans are coming to the conclusion that their future well-being is more permanent and better assured in an organisation such as ours.

We look forward with every confidence to our already very high reputation of quality and service being maintained and continuously enhanced. Over the past year the load on our order-book has increased, but we are hopeful that we shall be able so to organise ourselves as to give a steadily increased tonnage from the works during the current and subsequent years, thus reducing our load proportionately, which, while it will be very acceptable from the company's point of view, will also, I am sure, be extremely appreciated by our customers.

### Nationalisation and Efficiency

I have on previous occasions, at this company's meetings and others, expressed a view, either rightly or wrongly, that experiments in nationalisation of certain industries are very desirable, consistent with a new type of mental outlook by Government officials being possible of development, and adequate local discretion being allowed to responsible officials.

The success or failure of nationalisation schemes appears to me to depend entirely upon the character of "set-up," that is, adopting and embracing in it adequate recognition for keen, enthusiastic and hard-thinking people on the research and development side of the industries, with suitable appreciation by way of remuneration for those people who do produce novel, workable and beneficial schemes; and that recognition and appreciation should be prompt, too. The old idea that has existed that enthusiastic thinking should be considered as part of the job of the official, must be regarded as completely dead.

In the matter of compensation, if British liking for equity is to prevail, simply to fix, as the purchase price, Stock Exchange values at a given date is quite wrong, as such prices have a definite tendency to be high in cases where the dividend is high, whereas an enterprise which is conservative in its dividend policy may have as a result much more valuable assets to hand over. Proper regard must be had to prospective "earning capacity" over, say, the next 10 years where equity shares are concerned, and where fixed dividend securities are involved, then an assured continuance of the same income per annum.

Second thoughts in relation to the steel trade by the Government will, I think, prove by far the wiser in the end, for this is an industry whose life's blood is represented by keen and enthusiastic thinking, and gives scope of the fullest possible play to British individuality; in this case I am myself convinced that only private enterprise can conduct successfully an industry of this character. The talent and the will exist in the steel trade to-day to overcome its troubles, and it will require some years to develop healthily, but that development will come I am sure. I feel that the steel industry is unsuited for any kind of central control, direction or nationalisation.

Our two subsidiaries, Chatwins, Limited, and J. & J. Whitehouse (Tipton), Limited, are making very excellent progress, the former in producing a line of grates and ranges for domestic use of modern design and of first-class quality in every respect. Of J. & J. Whitehouse (Tipton), Limited, I can employ equally encouraging terms, although the whole of its products is, in the main, of a type which is exclusively required for export markets.

The trading profit amounts to £28,000 odd and, compared with the previous year of roughly £25,000, shows an increase of about £4,000. Your directors consider that as the profit is somewhat higher, and due to their cautious and vigilant outlook, and the average dividend hitherto has been low, a further increase of 2½ per cent. over last year would be reasonable, *i.e.*, a final dividend of 15 per cent., which, together with an interim dividend already paid, makes 20 per cent. for the year. The report was adopted.

# RECOMMENDED TIN ALLOCATIONS

## CHINA NOW REPRESENTED ON COMBINED COMMITTEE

At a recent meeting of the Combined Tin Committee in Washington, the following were recommended as final allocations of tin metal for the second half of 1946. These amounts include quantities already allocated during the period in question on an interim basis, and represent imports only. The allocations, which do not include domestic production figures, are in long tons:—

Austria, 225; Argentina, 200; Brazil, 225; Canada, 1,365; Ceylon, 40; Chile, 25; Czechoslovakia, 680; Denmark, 275; Egypt, 200; Finland, 135; France, 4,550; Greece, 90; India, 2,275; Italy, 910; Iran, 25; Latin-American countries not elsewhere specified, 165; Mexico, 25; Middle East, 150; Norway, 135; Poland, 410; Switzerland, 730; Sweden, 775; U.S.A., 7,280; Yugoslavia, 180.

In general, supplies may be obtained from the following sources:—Belgian, United Kingdom (including Malaya) or Dutch sources, South Africa, Japanese stocks in the U.S.A. For the Latin-American countries, however, the United States is an additional source for limited quantities, and supplies will also be available to France from French-Indo China and to the United States from China. Allocations are recommended on the basis of replies submitted to the periodic questionnaires sent out by the Committee. A questionnaire covering the first half of 1947 has recently been sent to all concerned.

At the meeting of the Committee, China was formally represented for the first time, so that the membership now consists of Belgium, China, France, the Netherlands, the United Kingdom, and the United States.

# UNITED KINGDOM TIN POSITION

The Ministry of Supply has released the following figures showing the United Kingdom tin position for the month of October:—

| | Ministry. | Consumers. |
|---|---|---|
| | Long tons. | Long tons. |
| TIN METAL:— | | |
| Stocks at October 1 | 8,738 | 4,237 |
| Arrivals | — | — |
| Production | 2,964 | — |
| | 11,702 | 4,237 |
| Deliveries: | | |
| To U.K. consumers ..2,627 | — | 2,627 |
| For export 53 | 2,680 | — |
| | | 6,864 |
| Consumption | — | 2,590 |
| Stocks at October 31 | 9,022 | 4,274* |
| TIN ORE (Tin content):— | | |
| Stocks in U.K. at October 1 | 8,052 | |
| Stocks in U.K. at October 31 | 7,727 | |

* Calculated. Reported 3,936 tons.

# RESEARCH IN PRODUCTION ENGINEERING

Mr. John Wilmot, Minister of Supply, speaking at a reception held at the Savoy Hotel, London, W.C.2, last week, to mark the inception of the Production Engineering Research Association of Great Britain, said that metal products made to precision limits were essential to the economic structure of the country. He wished the new body every success.

The Association, which is supported by the Department of Scientific and Industrial Research, was formed by the Institution of Production Engineers, the Machine Tool Trades' Association, the Gauge and Tool Makers' Association, and the National Federation of Engineers' Tool Manufacturers, with the object of assisting British industry to improve its productive efficiency. The researches carried out will cover the whole range of production engineering activities, resulting in improvements in the design and quality of production equipment and also in the provision of technical data essential for the most efficient utilisation of such equipment. Membership of the Association is therefore open, not only to the manufacturers of tools, machine tools, gauges, cutting fluids, etc., but also to the users of this equipment. Lord Riverdale is to be the first president of the Association.

# I.B.F. ISSUES HOUSE ORGAN

November saw the first publication of the Journal of the Institute of British Foundrymen. It is to appear five times annually, and will give members information of a domestic character. The president of the Institute, Mr. D. H. Wood, has written a foreword, and we would take this opportunity of thanking him for his expression of gratitude of the help the FOUNDRY TRADE JOURNAL has given since the inception of the Institute, and the assurance of the continuity of that collaboration in the future. The eight pages are devoted to council and committee activities; an interesting account of the unique J. W. Gardom Student Fund; biographies of four branch presidents; a review of the "Atlas of Defects"; a list of new members elected; a column of personal notes, and an account of the first post-war meeting of the International Technical Committee. The last page carries a list of forthcoming events. It is a well-edited and nicely laid out publication of considerable interest to members.

THE AWARD for the best annual financial report submitted by a junior achievement company will be made next spring by the New York Stock Exchange. The junior firms are private businesses organised and operated by teen-age boys and girls and sponsored by some of America's leading industries. The aim of these firms—there are about 900 making and selling their products in their own localities throughout the United States—is to help youth to learn about private industry by actually operating a business.

## NEWS IN BRIEF

THE DESIGNS for the new cupro-nickel coins will be the same as for the silver coins of 1937.

THE ADDRESS OF Meigh High Tensile Alloys, Limited, is now 214, Prestbury Road, Cheltenham, Glos.

ABSENTEEISM FROM ALL CAUSES in the factories of Tube Investments, Limited, during the quarter ended September 30, was the lowest on record, Major A. L. Atwil, assistant director of welfare of the company, has stated.

THE INVESTIGATION OF cast-iron roll manufacture in Germany, with notes on the usage in rolling-mill plants, is the subject of B.I.O.S. Report 737. This report may be obtained from H.M. Stationery Office, York House, Kingsway, London, W.C.2, price 11s. 9d., post free.

METROPOLITAN VICKERS ELECTRICAL COMPANY, LIMITED, have taken a short-period tenancy of part of the Atlas Locomotive Works, Springburn, Glasgow, of the North British Locomotive Company, Limited, and are at present engaged in the assembling of electric locomotives there.

THE UNITED PATTERNMAKERS' ASSOCIATION has concluded a new agreement with the employers in the light-castings industry. This is based on a collective bonus system and provides for an average wage of £6 10s. 2d. for a 47-hr. week. The Association states that the men should be able to earn more than this.

THE OUTSTANDING £501,400 4½ per cent. debenture stock of the Pirelli-General Cable Works, Limited, is to be redeemed at 105 per cent. on March 1. Holders are given the right to convert into a new 3½ per cent. debenture stock, of which £750,000 worth is to be issued, and also to subscribe in cash at 105 for any 3½ per cent. stock not converted.

MR. CHURCHILL received in his room at the House of Commons, recently, a deputation from the Society of Engineers, which presented him, on behalf of the council and members of the society, with a certificate of honorary fellowship. In making the presentation, Mr. F. Parfett, past-president, said that it was proposed to institute an annual Winston Churchill award in connection with the society.

AN INTIMATION THAT in future the question of shipyard redundancy would be dealt with by the Government and not by National Shipbuilders' Security, Limited, has been received in a letter to Mr. F. T. Willey, M.P. for Sunderland, from Mr. W. Edwards, Civil Lord of the Admiralty. The letter stated that the certificate granted to National Shipbuilders' Security under the Finance Act of 1935 had been cancelled.

TUBE INVESTMENTS, LIMITED, have completed the purchase out of their own resources of the Hercules Cycle & Motor Company, Limited, for approximately £3,250,000. The Hercules Company will continue to operate as a separate entity. Sir Edmund Crane, who was responsible for the establishment and development of the Hercules Company, has accepted an invitation to join the board of Tube Investments.

THE DIRECTORS OF Lake & Elliot, Limited, iron and steel founders, etc., of Braintree, Essex, announce that permission has been sought to issue 100,000 irredeemable preference shares. It is proposed to redeem the balance of the 7 per cent. redeemable preference shares from the proceeds of this issue. Present conditions, they consider, do not warrant a further reduction of the company's capital by the annual drawing of the 7 per cent. preference shares. There is about £84,300 of redeemable preference shares outstanding.

MR. J. W. BELCHER, M.P., Parliamentary Secretary to the Board of Trade, addressing a production conference at Worcester, recently, said there was nothing frivolous about the production drive; it was a matter of life and death for the nation. Besides being faced with a shortage of raw materials, resulting from the war, there was also a shortage of man-power and, whatever we did, there was no doubt it was going to be of long duration. He asked for understanding and co-operation between all concerned in the industrial set-up of the country.

THE INTERNATIONAL NICKEL COMPANY OF CANADA, LIMITED, have raised their United States prices for nickel, the increases being effective as from November 26, and bringing the U.S. price into line with the world price, which remains unchanged at £190 per ton in London. The contract price for electrolytic nickel from the Port Colborne refinery in Ontario will, it is understood, be 35 cents per lb.—the published spot price previously obtaining in the United States. The price to general contract customers in the United States was previously 31½ cents per lb.

MR. ALFRED EDWARDS, M.P., speaking at Darlington recently, said: "We have bitten off as much as we can chew, and we had better not jeopardise a splendid first year's record by being rushed into schemes by doctrinaires before we have demonstrated to the country's satisfaction that we are on the right lines. If I am in doubt what to do with the steel or any other industry, that is the very best reason for leaving them alone. The steel industry never sank to the depth of the cotton industry, and we have promised them both private enterprise and financial assistance."

## NEW CATALOGUE

**Rolls.** A complete range of rolls for steel and non-ferrous rolling mills is described and well illustrated in a 24-page catalogue just released by Sir W. G. Armstrong Whitworth & Company (Ironfounders), Limited, of Close Works, Gateshead-on-Tyne. The brochure opens with an impressive picture of the roll turning shop at Gateshead, and, after a well-written introduction, there are views accompanied by technical data of the making and assembly of the moulds, followed by pictures of the various types manufactured. The final illustration shows eight types of wobblers now available to the rolling mills. It is pleasing to note that this section of the foundry industry is keeping well abreast of the times in both metallurgical and mechanical fields.

# THE MODERN PIG

**IF YOU WANT...**
***clean iron, free from sand, free from sows ...uniform analysis... convenient size...easy handling... specify STANTON MACHINE CAST PIG IRON***

SPECIFICATION

| | |
|---|---|
| WEIGHT | 80-90 lbs. |
| Length | 22 inches |
| Width | 8½ inches |
| Thickness | 3¾ inches |

(at notch 2½ inches).

*Made in our well-known*

**STANTON, HOLWELL & RIXONS BRANDS**

**THE STANTON IRONWORKS COMPANY LIMITED NEAR NOTTINGHAM**

## COMPANY RESULTS

*(Figures for previous year in brackets.)*

**Silentbloc**—Interim dividend of 12½% (same).

**Birfield Industries**—Dividend of 12½% (same).

**Lyon & Lyon**—Interim dividend of 5% (same).

**George Kent**—Interim dividend of 3% (same).

**Round Oak Steel Works**—Dividend of 8% (same).

**N. Greening & Sons**—Interim dividend of 2½% (same).

**John Harper & Company**—Interim dividend of 5% (same).

**Hick, Hargreaves & Company**—Interim dividend of 2% (same).

**Francis Morton & Company**—Interim dividend of 7½% (same).

**Ambrose Shardlow & Company**—Interim dividend of 2½% (same).

**Scottish Machine Tool Corporation**—Interim dividend of 3% (same).

**Fleming & Ferguson**—Final dividend of 10%, making 15% (same).

**Lake & Elliot**—Final dividend of 16% (15%), making 20% (same).

**John Brown & Company**—Interim dividend of 3½%, tax free (same).

**Metropolitan Electric Cable & Construction Company**—Interim dividend of 5% (same).

**British Electric Transformer Company**—Final dividend of 10% (same), making 50% (20%).

**British Rola**—No final dividend, the interim dividend of 15% representing the total for the year (same).

**Crompton Parkinson**—Final dividend on the ordinary and "A" ordinary shares of 7½% and bonus of 7½%, making 22½% (same).

**Wellworthy Piston Rings**—Trading loss to July 31, after depreciation, £52,050 (profit £61,506); dividend of 15% (same); forward, £27,773 (£23,235).

**Vokes**—Net profit for the year ended June 30, after depreciation, etc., £11,549 (£10,785); dividend of 12½% (same dividend and bonus of 7½%); forward, £21,748 (£16,449).

**Universal Grinding Wheel Company**—Profit to September 28, £88,834 (£73,646); to general reserve, £50,000 (£25,000); dividend of 15%, tax free (same); forward, £34,916 (£32,482).

**Wilkes**—Net profit, before tax, for the year ended July 31, £3,262 (£6,949); to taxation, £1,175 (£3,680); preference dividend, £601 (£546); ordinary dividend of 10% (same); forward, £4,318 (£4,227).

**B. & F. Carter & Company**—Trading, etc., profit to July 31, £15,980 (£17,926); depreciation, £4,778 (£5,539); income tax and E.P.T. reserve, £7,898 (£8,548); dividend of 10% (same); forward, £11,236 (£11,681).

**Edward Wood & Company**—Profit to August 31, £42,133 (£34,087); dividend of 10% (9%); to employees under profit sharing scheme, £3,000 (£2,500); tax reserve, £20,000 (£15,000); deferred repairs, £2,000 (same); forward, £25,189 (£29,007).

**Hale & Hale (Tipton)**—Net trading profit to August 4, £28,557 (£24,888); fees, £400 (same); depreciation, £5,634 (£6,961); final dividend of 15% (12½%), making 20% (17½%); to reserve, £5,000 (same); forward, £14,059 (£10,423).

**Fairfield Shipbuilding & Engineering Company**—Profit for the year ended June 30, after taxation, £164,164 (£152,513); to depreciation, £50,000 (same); debenture interest, £12,500 (same); preference dividend, less tax, £7,875 (£15,000 gross); contingencies reserve, £50,000 (same); dividend of 10% (same); forward, £95,170 (£68,521).

**Kendall & Gent**—Net profit for the year ended September 30, after taxation, depreciation, etc., £13,510 (£14,756); war contingencies reserve not required, £10,000 (nil); final dividend of 10% and bonus of 5%, making 20% (same); special depreciation on loose tools, etc., £4,000 (£2,500); general reserve, £5,000 (nil); forward, £23,414 (£21,004).

**Tube Investments**—Net profit for the year ended October 31, £838,281 (£808,195); transfer from contingencies, nil (£400,000); to general reserve, £300,000 (same); dividend stabilisation reserve, nil (£250,000); final dividend of 12½%, making 22½% (same, and special distribution of 10% out of contingencies reserve); additional transfer to general reserve, nil (£211,317); forward, £328,978 (£290,145).

**Dorman, Long & Company**—Net profit from consolidated profit and loss account for the year ended September 30, £595,013 (£556,158); 6½% preference dividend, £102,172 (£92,884); general reserve, £250,000 (same); dividend on 8% non-cumulative second preference shares, £29,169 (£26,158); dividend of 16% on the preferred ordinary shares (same) and of 8% on the ordinary shares (same); forward, £93,228 (£77,887).

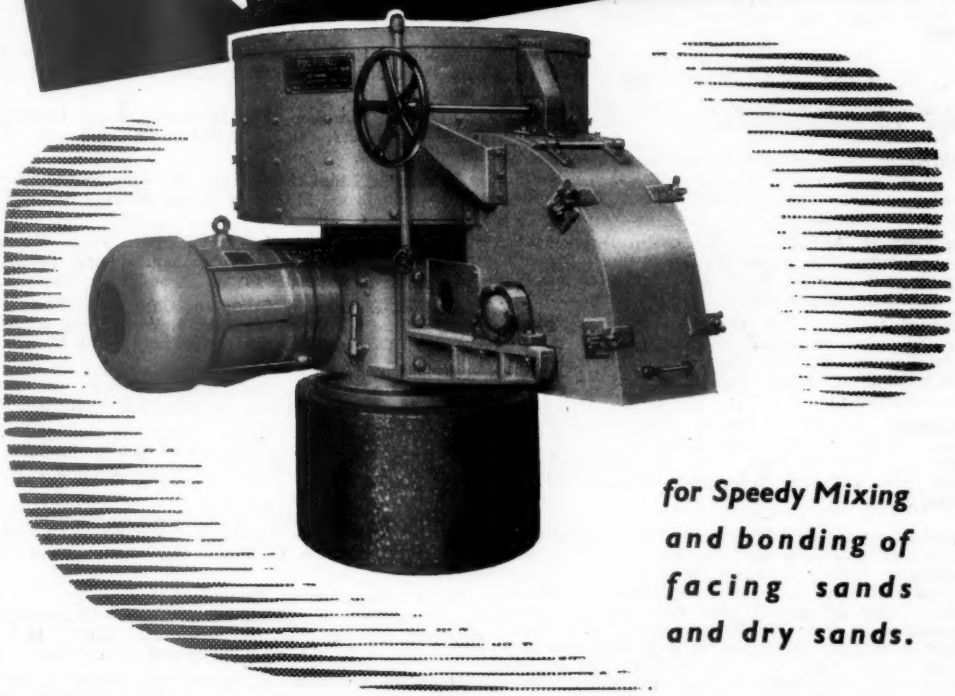
**Associated Equipment Company**—Profit for the year ended September 30, after appropriations to depreciation and replacement reserve, crediting interest, price adjustments no longer required, etc., £950,000 (£1,035,500); depreciation, etc., reserve, £175,000 (£148,000); taxation provision, £667,500 (£865,000); employees' benefit reserve, £20,000 (same); general reserve, £45,000 (£21,000); final dividend of 10% (5%), tax free, making 12½% (7½%), tax free; forward, £300,000 (£270,000).

**Cargo Fleet Iron Company**—Profit for the year ended September 30, £144,823 (£154,192); profit arising from past years, £140,000 (nil); to debenture interest, £36,691 (£37,180); directors' fees, £1,500 (same); debenture stock trustees' remuneration, £262 (same); staff

(*Continued on page* 388, *column* 1.)

PAT. Nº 570997

"POLFORD" REGISTERED MOTOR DRIVEN MIXER MILLER WITH DISINTEGRATOR



*for Speedy Mixing and bonding of facing sands and dry sands.*

**SOLE AGENTS :**

THOS. W. WARD, LIMITED, Albion Works, Sheffield

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(*Continued from page 386.*)

pensions and life assurance scheme, £7,895 (£7,470); provision for supplementary non-contributory pensions, £5,000 (nil); debenture sinking fund, £12,607 (£12,119); provision for taxation, £70,000 (£30,000); war damage contribution, nil (£254); depreciation, £100,000 (£65,000); dividend of 5% (nil); forward, £100,683 (£99,815).

**William Asquith**—Trading profit and sundry income, together with subsidiary company, to August 15, £48,007 (£73,018); to depreciation, £23,475 (£17,442); directors' fees, £4,000 (same); war damage, nil (£122); taxation, less estimated E.P.T. recoverable of £13,500 (£6,960), £500 (£21,000); profit attributable to outside shareholders in subsidiary company, £14 (£7); profits to shareholders in William Asquith, £21,018 (£30,447); profit retained in accounts of subsidiary company, £590 (£2,089); net profit, £20,428 (£28,358); preference dividend, £7,036 (£6,622); ordinary dividend of 10% (5%); provision for redemption and interest on Funding Certificates, nil (£43,394); forward, £12,697 (£3,792).

## CONTRACTS OPEN

*Any date given is the latest on which tenders will be accepted. The address is that from which forms of tender may be obtained.*

**Atherstone,** December 20—Construction of a sewer, for the Rural District Council. Mr. D. C. Smith, engineer and surveyor, Council Offices, Atherstone. (Fee £3 3s., returnable.)

**Huddersfield,** December 23—B.S. cast-iron pipes, B.S. special castings and other special castings, for the Town Council. Mr. H. Bann, town clerk, Town Hall, Ramsden Street, Huddersfield.

**Neyland,** January 13—Construction of sewers, manholes and other incidental works, for the Urban District Council. A. P. I. Cotterell & Son, engineers, 54, Victoria Street, Westminster, London, S.W.1. (Fee £3 3s., returnable.)

**Southgate,** January 1—Supply and erection of approx. 250 yds. of 5 ft. high chain link fencing, for the Borough Council. Mr. J. T. W. Peat, borough engineer and surveyor, Town Hall, Palmers Green, London, N.13.

THE INSTITUTION OF METALLURGISTS announce that arrangements have been made for the operation of an appointments register, commencing in the New Year, the purpose of which is to put in touch members of the Institution who are seeking posts and employers having vacancies on their metallurgical staffs. Employers are invited to send particulars of their vacancies for qualified metallurgists to the Institution. A list of vacancies notified by employers, or advertised, will be circulated at frequent intervals to members of the Institution whose names are included in the register. Inquiries should be addressed to the Registrar, Appointments Register, Institution of Metallurgists, 4, Grosvenor Gardens, London, S.W.1.

## NEW COMPANIES

*("Limited" is understood. Figures indicate capital. Names are of directors unless otherwise stated. Information compiled by Jordan & Sons, 116, Chancery Lane, London, W.C.2.)*

**Chalmers Engineering & Foundry Works,** St. Brides Green, Brynmenin, Glam—£1,000.

**F. C. Ide Engineering**—£5,000. C. F. Ide, Empire Chambers, Richmond Road, Kingston.

**Aluminium & Alloys**—£2,000. C. Lensler, 92, Lancaster Close, London, W.2, subscriber.

**Leach & Thompson (Steel),** Grange Street, Keighley £1,000. W. S. and A. Barker.

**Brian (Electro Plating),** 1, Dove Road, London, N.1—£1,000. T. W. Wexler and N. Jacobs.

**G. H. Patents,** Torbay Street, Holbeck, Leeds—Precision engineers, etc. £5,000. G. and L. Hayes.

**Gravel Gate Foundry Company,** Sefton Street, Hollinwood, Lancs—£1,000. J. H., H., and W. Ainsbury.

**Woodhill Engineering Company,** 3, Copthall Buildings, London, E.C.—£1,000. A. G. H. Hill and R. B. Woods.

**Freeman, Morrison,** 177, Portobello Road, London, W.11—Engineers, etc. £1,000. H. and A. B. Morrison.

**Armstrong Elliot (Engineers),** 24, Dean Street, Newcastle-upon-Tyne—£1,000. J. Elliot, B. M. and D. M. Armstrong.

**G. Waghorn & Company,** 510a, High Road, Tottenham, London, N.15—Mechanical and general engineers, etc. £2,000. G. W. D. and E. J. Waghorn.

**Castwel Engineering Company,** Carr Mills, Buslingthorpe Lane, Leeds, 7—£1,200. J. Williamson, B. M. Jones, H. Dixon, A. Flear, E. Neal, and A. D. Hartley.

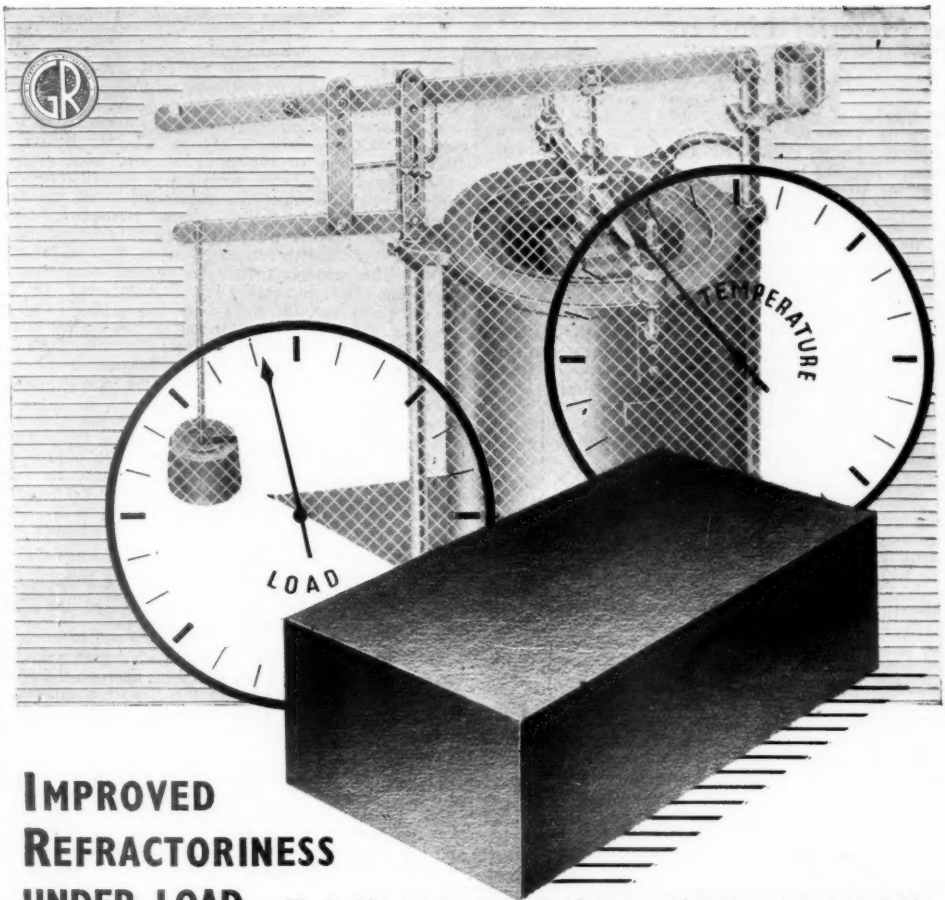
**Mono-Cam**—Designers and manufacturers of fuel-injection and other pumps, etc. £20,000. F. W. Edmonds, 18, Austin Friars, London, E.C.2, subscriber.

**Walter Machines,** 3, Kings College Mews, London, N.W.3—Manufacturers of machine tools, founders, engineers, etc. £3,000. W. C. Weilenman and A. F. Eyres.

**S. Camm (Morecambe),** 12, Thornton Crescent, Morecambe and Heysham—Mechanical and general engineers, etc. £1,000. S. G. Camm, W. Wiltshire, and H. Wallis.

**D. J. Ringwood & Company,** Bridgeway House, Hammersmith Bridge Road, London, W.6—Mechanical engineers and machinery merchants, etc. £2,000. D. J. Ringwood, M. M. Snow, A. Long and R. A. Slipper.

**Domdews Holdings**—To acquire all or any of the stock, shares or securities of the Cadomin Coal Company, Limited (regd. in Canada), and to carry on business of ironmasters, steelmakers, etc. £15,000. G. Leathers, J. R. Gibbons, C. H. Pain, and R. B. Grainger, 8, Victoria Street, Liverpool, 2.

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## Raw Material Markets

### IRON AND STEEL

The burden of providing requisite tonnages of high-phosphorus iron for the light-castings industry is shouldered almost exclusively by the Midland blast furnaces. Regular and reasonably adequate deliveries are coming to hand, and all the light foundries are taking up their full quotas. Small parcels of refined iron are being licensed for shipment without detriment to the interests of home consumers, but the full output of hematite and of low- and medium-phosphorus iron is required either for the steelworks or for the satisfaction of the growing needs of the engineering and speciality foundries.

British steelmakers are delivering substantial tonnages of steel semis to the re-rollers and sheet makers, but for many years home production has fallen short of total requirements, and increased demand, synchronising with the closing of the pipe lines from Europe in one direction and from the United States in the other, has created a very difficult situation. Re-rollers have adapted works' technique to the use of defective billets, double-sawn crops, etc., and are rolling bars and sections for export from discard steel and scrap. But there is still a deficiency of primes which threatens the continuance of full-scale activity in the re-rolling mills.

Reauthorisation of orders for sheets are still reaching the works and are adding to the prevailing congestion. The Minister of Supply has promised special consideration to the claims of the motor industry, but these have to be reconciled with other high-priority demands, among which the housing programme stands pre-eminent. There seems to be no hope of substantial relief for some months ahead. Rollers of steel plates are also indicating delivery dates extending into Period II of next year, while the bulk of the output of bars and sections in Period I is already booked. Wire drawers can scarcely keep pace with their commitments.

### NON-FERROUS METALS

The use of refined copper in manufactured products in the United States in October was the largest since May, 1945. Deliveries of manufactured products contained 130,191 tons of refined copper; in May, 1945, deliveries contained 131,670 tons. In September, 1946, 113,305 tons of copper were utilised in products delivered. Manufacturers of copper, brass and other alloys received 134,712 tons of the metal during October, of which 83,636 tons was domestic metal and 51,076 tons of foreign origin. In September, they received 112,856 tons, of which 63,553 tons were domestic. Stocks of copper held by U.S. manufacturers at the end of October totalled 387,943 tons, compared with 381,791 tons at the end of September.

Copper consumption in this country rose in October to the highest level since the end of the war. With an increase of 2,700 tons to 31,976 tons, it reached nearly one and a half times the average monthly home consumption in 1935-38. Scrap consumption rose 4,660 tons to 17,916 tons. Net imports of unwrought copper in October amounted to 23,000 tons, which means that stocks, having risen from 73,100 tons in May to 94,700 tons in September, must now be returning to the neighbourhood of 85,000 tons.

In his statement circulated with the accounts of Roan Antelope Copper Mines, Mr. A. Chester Beatty, the chairman, refers to the unsatisfactory coal situation caused by the railway company's inability to carry sufficient coal to meet the requirements of the mine. The fuel problem is entirely one of transport, he says. During the year it was necessary to suspend operations for five days in January and six days in May and June. The prospects for the current year are not promising and inevitably production will be curtailed on this account.

Stocks of virgin zinc at the end of September totalled 54,300 tons, against 61,300 tons at the end of the previous month and 157,600 tons on September 30, 1945. On September 30 last the Government held in addition 15,600 tons abroad.

Mr. Felix E. Wormser, secretary of the U.S. Lead Industries Association, said recently that the domestic supply of lead—both newly mined and scrap—next year would fall 255,000 tons below estimated needs. Total use next year is estimated at 1,055,000 tons.

### OBITUARY

MR. JAMES THOMAS TURNER, who died recently in his 82nd year, was managing director of the Rochdale Carriage Company (1914), Limited.

MR. JOHN WILLIAM VESSEY, chairman of John Vessey & Sons, Limited, crucible and rustless steel makers and founders, of Sheffield, and a director of Matthias Spencer & Sons, Limited, manufacturers of mining tools, drill steel, etc., also of Sheffield, has died at the age of 65.

MR. JOHN WILLIAM AINSWORTH, managing director of Wm. Boydell & Sons, Limited, ironfounders, of Leigh, Lancs, a member of the executive committee of the Manchester and District Ironfounders' Association and vice-president of the Leigh Engineering Society, has died at the age of 68.

MR. FRANK LUDLOW, who has died at Ewell, Surrey, at the age of 51, was formerly general manager at Newcastle-upon-Tyne for George M. Carter (Erectors), Limited, structural engineers. In 1944 he joined Cozens & Sutcliffe, Limited, structural engineers, etc., of Muswell Hill, London, N.10, as chief engineer.

OWING TO SHORTAGE of railway trucks, the Skinningrove Iron Company, Limited, Saltburn, Yorks, have had to reduce operations at their rolling mills. Normally these are worked to the extent of 17 shifts a week; the number is now down to 12 and the loss of output is estimated at 1,000 tons of rolled steel per week.